Volume 2, SF Bay and Central Coast Regional Reports

Tracy Hemmeter [themmeter@valleywater.org]

Sent: Tuesday, December 10, 2013 12:46 AM
To: DWR CWP Comments
Attachments: Summary of Comments on Vol~1.pdf (1 MB) ; Summary of Comments on Vol~2.pdf (1 MB)

The Santa Clara Valley Water District's comments on the San Francisco Bay and Central Coast Regional Reports are attached.

Santa Clara Valley Water District

TRACY HEMMETER
SENIOR PROJECT MANAGER
Water Utility Enterprise
Santa Clara Valley Water District
(408) 630-2647
themmeter@valleywater.org

San Francisco Bay Hydrologic Region — Table of Contents

Summary of Comments on Vol2_SanFranciscoBayRR_PRD_Edited_Sept25_MT_FG_Final_wo_jw_DAM_comments.pdf

Page: 1

1 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 9:58:30 AM

Some of the text in very general and doesn't contribute to an understanding of the conditions and issues in the SF Bay region. Suggest brief summaries and references to other CWP volumes. Examples include things like the background on the CASGEM and some of the climate change discussion.

San Francisco Bay Hydrologic Region

San Francisco Bay Hydrologic Summary

The San Francisco Bay Hydrologic Region (Bay Region) occupies approximately 4,500 square miles; from southern Santa Clara County to Tomales Bay in Marin County; and inland to the confluence of the Sacramento and San Joaquin rivers near Collinsville. The region has many significant water management challenges — sustaining water supply, water quality, and the ecosystems in and around San Francisco Bay; reducing flood damages; and adapting to impacts from climate change. A thorough discussion of climate change is presented including precipitation variability, reduced snowpack accumulation in the Sierra Nevada, and vulnerability of developed bay and coastal areas to sea level rise. However, with strong water planning and governance and several resource management strategies that can be applied, the region is poised to address these challenges effectively.

PLACEHOLDER Table SFB-1 Water Governance, San Francisco Bay Hydrologic Region

[Any draft tables, figures, and boxes that accompany this text for the public review draft are included at the end of the report.]

Current State of the Region

Setting

The Bay Region includes all of San Francisco County and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda counties. It occupies approximately 4,500 square miles from southern Santa Clara County to Tomales Bay in Marin County and inland to the confluence of the Sacramento and San Joaquin rivers at the eastern end of Suisun Bay (Figure SFB-1). The eastern boundary follows the crest of the Coast Ranges; where the highest peaks are more than 4,000 feet above mean sea level.

PLACEHOLDER Figure SFB-1 Map of the San Francisco Bay Hydrologic Region

For nearly a century, water agencies in the region have relied on importing water from the Sierra Nevada to supply their customers. Water from the Mokelumne and Tuolumne rivers accounts for about 38 percent of the region's average annual water supply. Water from the Sacramento-San Joaquin River Delta (Delta) via the federal Central Valley Project (CVP) and the State Water Project (SWP) accounts for another 28 percent. Approximately 31 percent of the average annual water supply is from local groundwater and surface water, and 3 percent is from miscellaneous sources such as harvested rainwater, recycled water, and transferred water. Population growth and diminishing water supply and water quality have led to the development of local surface water supplies, recharge of groundwater basins, and incorporation of conservation guidelines to sustain water supply and water quality for future generations.

The Sacramento and San Joaquin rivers flow into the Delta and into San Francisco Bay. The Delta is the largest estuary on the West Coast, receiving nearly 40 percent of the state's surface water from the Sierra Nevada and the Central Valley. The interaction between Delta outflow and Pacific Ocean tides determines how far salt water intrudes into the Delta. The resulting salinity distribution influences the

Page: 7

2 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:00:17 AM
I think only EBMUD and SFPUC have been importing water that long. The State Water Project is much newer.

3 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 9:58:59 AM
some

distribution of many estuarine fish and invertebrates, as well as the distribution of plants, birds, and animals in wetlands areas. Delta outflow varies with precipitation, reservoir releases, and upstream diversions. An average of 18.4 million acre-feet (maf) of freshwater flows out of the Delta annually into the bay (California Data Exchange Center [CDEC] 2000–2008). Daily tidal flux through the Carquinez Strait is much greater than the freshwater flows.

The Bay Region boasts significant Pacific Coast marshes such as the Pescadero and Tomales Bay marshes, as well as San Francisco Bay itself. San Francisco Bay is relatively shallow, with 85 percent of its area less than 30-feet deep. Much of the perimeter of the bay is shallow tidal mud flats, tidal marshes, diked or leveed agricultural areas, and salt ponds. These tidal baylands support important aquatic and wetland habitats and have been the focus of many restoration activities over the past 30 years. The physical extent of the bay in the future will depend on the balance between sea level rise, sediment loading, and potential tectonic subsidence or uplift.

The north lobe of San Francisco Bay is brackish and is known as San Pablo Bay. It is surrounded by Marin, Sonoma, Napa, and Solano counties. Suisun Marsh is between San Pablo Bay and the Delta and is the largest contiguous brackish marsh on the West Coast of North America, providing more than 10 percent of California's remaining natural wetlands. The south and central lobes of San Francisco Bay are saltier than San Pablo Bay, as the marine influence dominates.

Watersheds

The California Department of Water Resources (DWR) has grouped the watersheds in the Bay Region into seven hydrologic units, as shown in Figure SFB-2. The Suisun, San Pablo, and Bay bridges hydrologic units drain into Suisun, San Pablo, and North San Francisco bays, respectively. The South Bay and Santa Clara hydrologic units drain into South San Francisco Bay, and the Marin Coastal and San Mateo hydrologic units drain directly into the Pacific Ocean. Figure SFB-2 also shows 16 principal watersheds in the region. The Guadalupe River and Coyote and Alameda creeks drain from the Coast Ranges and generally flow northwest into San Francisco Bay. The Alameda Creek watershed is the largest in the region at 633 square miles. The Napa River originates in the Mayacamas Mountains at the northern end of Napa Valley and flows south into San Pablo Bay. Sonoma Creek begins in mountains within Sugarloaf State Park, then flows south through Sonoma Valley into San Pablo Bay.

PLACEHOLDER Figure SFB-2 Principal Watersheds in the San Francisco Bay Hydrologic Region

Surface Water Bodies

The most prominent surface water body in the Bay Region is San Francisco Bay itself. Other surface water bodies include:

- Creeks and rivers (see above)
- Ocean bays and lagoons (such as Bolinas Bay and Lagoon, Half Moon Bay, and Tomales Bay)
- Urban lakes (such as Lake Merced and Lake Merritt)
- Human-made lakes and reservoirs (such as Lafayette Reservoir, Briones Reservoir, Calaveras Reservoir, Crystal Springs Reservoir, Kent Lake, Lake Chabot, Lake Hennessey, Nicasio Reservoir, San Andreas Lake, San Antonio Reservoir, San Pablo Reservoir, Upper San Leandro Reservoir, and Lake Del Valle)

4

Page: 8

Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:00:53 AM

Anderson Reservoir,

Groundwater Aquifers

Groundwater resources in the Bay Region are supplied by both alluvial and fractured-rock aquifers. Alluvial aquifers are composed of sand and gravel or finer grained sediments, with groundwater stored within the voids, or pore space, between the alluvial sediments. Fractured-rock aquifers consist of impermeable granitic, metamorphic, volcanic, or hard sedimentary rocks, with groundwater being stored within cracks, fractures, or other void spaces. The distribution and extent of alluvial and fractured-rock aquifers and water wells vary within the region. Municipal and irrigation wells in the region's aquifers range in depth from about 100 to 200 feet in the smaller basins, and 200 to 500 feet in the larger basins. Well yields typically are less than 500 gallons per minute in the smaller basins, and range from less than 50 to approximately 3,000 gpm in the larger basins. A brief description of the aquifers for the region is provided below.

Aquifer Description

Alluvial Aquifers

The Bay Region contains 33 Bulletin 118-2003-recognized alluvial groundwater basins and subbasins underlying approximately 1,400 square miles, or about 30 percent of the region (California Department of Water Resources 2003). The majority of the groundwater in the region is stored in alluvial aquifers. Figure SFB-3 shows the location of the alluvial groundwater basins and subbasins, and Table SFB-2 lists the associated names and numbers. The most heavily used groundwater basins in the region are — in North Bay, Petaluma Valley and Napa-Sonoma Valley groundwater basins; in South Bay, Santa Clara and San Mateo subbasins of the Santa Clara Valley Groundwater Basin and Westside Groundwater Basin; and in East Bay, Niles Cone and East Bay Plain Subbasin of the Santa Clara Valley Groundwater Basin and Livermore Valley Groundwater Basin.

PLACEHOLDER Figure SFB-3 Alluvial Groundwater Basins and Subbasins within the San Francisco Bay Hydrologic Region

PLACEHOLDER Table SFB-2 Alluvial Groundwater Basins and Subbasins within the San Francisco Bay Hydrologic Region

Petaluma Valley Groundwater Basin is contained within Sonoma County. Napa-Sonoma Valley Groundwater Basin is composed of three subbasins — Napa Valley, Sonoma Valley, and Napa-Sonoma Lowlands — and is spread over Sonoma, Napa and Solano counties. Both Petaluma Valley and Napa-Sonoma Valley basins consist of a relatively thin cover of Quaternary alluvium overlying a thick section of volcanic, sedimentary, sedimentary, metamorphic, and serpentinite rocks. The Quaternary alluvium consists of interbedded cobbles, sand, silt, and clay interlaced with coarse-grained stream channel deposits. The main freshwater-bearing geologic unit is the alluvium and the sedimentary rocks that range from 10 feet to more than 300 feet in thickness and yield more than 100 gpm in areas where deposits are thick and saturated (U.S. Geological Survey 2010, Scientific Investigations Report 2010-5089).

The Santa Clara Valley Groundwater Basin is spread over four countries — Contra Costa, Alameda, Santa Clara and San Mateo — and is composed of four subbasins — Niles Cone, Santa Clara, San Mateo Plain, and East Bay Plain. Niles Cone Subbasin is composed chiefly of alluvial fans consisting of unconsolidated gravels, sands, silts, and clays. The underlying aquifer is both unconfined and confined due to the presence of local low-permeable layers. A majority of the water-bearing materials are composed of Quaternary alluvium, though the Santa Clara formation underlies a portion of the

Page: 9

5 Number: 1 Author: DeviMody Subject: Sticky Note Date: 11/15/2013 12:10:25 PM

Should be "counties", not "countries"

groundwater basin along its eastern margin, which likely exceeds a thickness of 500 feet. Santa Clara and San Mateo Plain Subbasins are composed of two major water-bearing formations — quaternary alluvium overlying the Santa Clara Formation. Both formations consist of gravels, sands, silts and clays with various grain-size distributions. The northern portion of this area is confined and is overlain by a clay layer of low permeability. The southern portion is generally unconfined and contains no thick clay layers. East Bay Plain Subbasin consists of artificial fill overlying unconsolidated sediments. The cumulative thickness of the unconsolidated sediments is about 1,000 feet, and these extend beneath the San Francisco Bay to the west.

Livermore Valley Groundwater Basin is the largest alluvial groundwater basin east of the San Francisco Bay. The primary water-bearing formations include valley-fill materials, the Livermore Formation, and the Tassajara Formation, which consist of continental deposits from alluvial fans, outwash plains, and lakes. The surficial valley-fill materials exist up to 400 feet thick, while the Livermore Formation can be up to 4,000 feet thick, consisting of unconsolidated to semi-consolidated beds of gravels, sands, silts, and clays. Under most conditions, the valley-fill materials and the Livermore Formation sediments yield adequate to large quantities of groundwater. However, wells tapping the Tassajara Formation yield small quantities of water, and there is little hydrologic continuity between it and the overlying water-bearing units.

Fractured-Rock Aquifers

Fractured-rock aquifers are generally found in the mountain and foothill areas adjacent to alluvial groundwater basins. Due to the highly variable nature of the void spaces within fractured-rock aquifers, wells drawing from fractured-rock aquifers tend to have less capacity and less reliability than wells drawing from alluvial aquifers. On average, wells drawing from fractured-rock aquifers yield 10 gpm or less. Although fractured-rock aquifers are less productive compared to alluvial aquifers, they commonly serve as the sole source of water and a critically important water supply for many communities. The majority of the water used in the San Francisco Bay Hydrologic Region is derived either from alluvial aquifers or from imported water supplies; therefore, information related to fractured-rock aquifers in the region was not developed as part of the *California Water Plan Update 2013* (Update 2013).

More detailed information regarding the aquifers in the San Francisco Bay Hydrologic Region is available online in Update 2013, Volume 4, Reference Guide, the article "California's Groundwater Update 2013 and DWR Bulletin 118-2003."

[1] *Well Infrastructure and Distribution*

Well logs submitted to DWR for water supply wells completed during 1977 through 2010 were used to evaluate the distribution of water wells and the uses of groundwater in the San Francisco Bay Hydrologic Region. DWR does not have well logs for all the wells drilled in the region; and for some well logs, information regarding well location or use is inaccurate, incomplete, ambiguous, or missing. Hence, some well logs could not be used in the current assessment. However, for a regional scale evaluation of well installation and distribution, the quality of the data is considered adequate and informative. The number and distribution of wells in the region are grouped according to their location by county and according to six most common well-use types: domestic, irrigation, public supply, industrial, monitoring, and other. Public supply wells include all wells identified in the well completion report as municipal or public. Wells identified as "other" include a combination of the less common well types, such as stock wells, test wells, or unidentified wells (no information listed on the well log).

6

Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:02:34 AM

This discussion seem out place. Suggest moving it to the Resource Management Conditions section.

More detailed information regarding assumptions and methods of reporting well log information is available online from Update 2013, Volume 4, Reference Guide, the article "California's Groundwater Update 2013."

California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization

The Legislature in 2009, as part of a larger package of water-related bills, passed Senate Bill 7x 6 (SBx7 6; Part 2.11 to Division 6 of the California Water Code § 10920 et seq.) requiring that groundwater elevation data be collected in a systematic manner on a statewide basis and be made readily and widely available to the public. DWR was charged with administering the program, which was later named the "California Statewide Groundwater Elevation Monitoring" or "CASGEM" Program. The new legislation requires DWR to identify the current extent of groundwater elevation monitoring within each of the alluvial groundwater basins defined under Bulletin 118-2003. The legislation also requires DWR to prioritize groundwater basins to help identify, evaluate, and determine the need for additional groundwater level monitoring by considering available data. Box SFB-1 provides a summary of these data considerations and resulting possible prioritization category of basins. *More detailed information on groundwater basin prioritization is available online from Update 2013, Volume 4, Reference Guide – California's Groundwater Update 2013.*

PLACEHOLDER Box SFB-1 California Statewide Groundwater Elevation Monitoring (CASGEM) Basin Prioritization Data Considerations

Figure SFB-7 shows the groundwater basin prioritization for the region. Of the 33 basins within the region, one basin was identified as high priority, six basins as medium priority, one as low priority, and the remaining 25 basins as very low priority; no basin was identified as very high priority. Table SFB-4 lists the high, medium, and low CASGEM priority groundwater basins for the region. The seven basins designated as high or medium priority account for more than 60 percent of the population and about 88 percent of groundwater supply in the region. The basin prioritization could be a valuable tool to help evaluate, focus, and align limited resources for effective groundwater management, and reliability and sustainability of groundwater resources.

PLACEHOLDER Figure SFB-7 CASGEM Groundwater Basin Prioritization for the San Francisco Bay Hydrologic Region

PLACEHOLDER Table SFB-4 CASGEM Groundwater Basins Prioritization for the San Francisco Bay Hydrologic Region

San Francisco Bay Hydrologic Region Groundwater Monitoring Efforts

Groundwater resource monitoring and evaluation is a key aspect to understanding groundwater conditions, identifying effective resource management strategies, and implementing sustainable resource management practices. California Water Code (§10753.7) requires local agencies seeking State funds administered by DWR to prepare and implement groundwater management plans that include monitoring of groundwater levels, groundwater quality degradation, inelastic land subsidence, and changes in surface water flow and quality that directly affect groundwater levels or quality. This section summarizes some of the groundwater level, groundwater quality, and land subsidence monitoring efforts within the San Francisco Bay Hydrologic Region. Groundwater level monitoring well information includes only active monitoring wells — those wells that have been measured since January 1, 2010. *Additional information*

Page: 12

11 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:03:06 AM

This discussion seems out of place. Suggest moving it to the Resource Management Conditions section.

12 Number: 2 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:03:18 AM

This discussion seems out of place. Suggest moving it to the Resource Management Conditions section.

Regional and statewide groundwater quality monitoring information and data are available on the State Water Resources Control Board (SWRCB) Groundwater Ambient Monitoring and Assessment (GAMA) Web site and the GeoTracker GAMA groundwater information system developed as part of the Groundwater Quality Monitoring Act of 2001. The GAMA Web site describes GAMA program and provides links to all published GAMA and related reports. The GeoTracker GAMA groundwater information system geographically displays information and includes analytical tools and reporting features to assess groundwater quality. This system currently includes groundwater data from the SWRCB, Regional Water Quality Control Boards (RWQCBs), California Department of Public Health (CDPH), Department of Pesticide Regulation (DPR), DWR, USGS, and Lawrence Livermore National Laboratory (LLNL). In addition to groundwater quality data, GeoTracker GAMA has more than 2.5 million depth-to-groundwater measurements from the Water Boards and DWR, and also has oil and gas hydraulically fractured well information from the California Division of Oil, Gas, and Geothermal Resources. Table SFB-6 provides agency-specific groundwater quality information. Additional information regarding assessment and reporting of groundwater quality information is furnished later in this report.

PLACEHOLDER Table SFB-6 Sources of Groundwater Quality Information

Land Subsidence Monitoring

Land subsidence has been shown to occur in areas experiencing significant declines in groundwater levels. In the San Francisco Bay Hydrologic Region, land subsidence is monitored in Santa Clara County by Santa Clara Valley Water District (SCVWD) and in Alameda County by East Bay Municipal Utilities District (EBMUD). SCVWD surveys hundreds of benchmarks each year to determine changes in the land surface elevation, monitors groundwater levels, and collects data from two 1,000-foot deep compaction wells designed to measure any changes in the land surface resulting from groundwater extraction (http://www.valleywater.org/Services/LandSubsidence.aspx). SCVWD also conducts numerical modeling to monitor subsidence in the area. EBMUD monitors land subsidence in the South East Bay Plain as part of its Bayside Groundwater Project (East Bay Municipal Utilities District 2013).

Ecosystems

Two-thirds of the state's salmon pass through San Francisco Bay and the Delta each year, as do approximately half of the waterfowl and shorebirds migrating along the Pacific Flyway (San Francisco Regional Water Quality Control Board 2004). However, the San Francisco Bay is one of the most modified estuaries in the United States. The topography, ebb and flow tides, local freshwater and Delta inflows, and sediment availability all have been altered. Many new species of plants and animals have been introduced. These exotic and invasive species, such as the Chinese Mitten Crab and the Asian Clam, threaten to undermine the estuary's food web and ecosystem. Approximately 500 species of fish and wildlife live in the Bay Region, of which 105 wildlife species are designated by State and federal agencies as threatened or endangered.

The land between the lowest tide elevations and mean sea level are tidal flats, which support an extensive community of invertebrate aquatic organisms, fish, plants and shorebirds. Historically; around 50,000 acres of tidal flats were situated around San Francisco Bay margins; but only about 29,000 acres remain.

Page: 14

13 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:04:14 AM
Need to mention that many local agencies monitor and produce reports on groundwater quality.

many tools available to recover coho salmon. The success of the recovery strategy depends on the long-term commitment and efforts of all who live in, or are involved with, coho salmon watersheds.

The Ecosystem Restoration Program (ERP) conservation strategy for the Delta and the Suisun Marsh Planning Area provides leadership for conservation and restoration. It was developed by DFW in collaboration with USFWS and National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries). The conservation strategy is intended to facilitate coordination and integration of all resource planning, conservation, and management decisions affecting the Delta and Suisun Marsh. It is integrally linked to the Delta Vision and the conceptual models developed under the Adaptive Management Planning Team, and takes into account sea level rise projections and the effects of potential seismic events. *Environmental restoration in the Delta is discussed more in the regional report Sacramento-San Joaquin Delta, of Volume 2 of Update 2013.*

Water Supplies

High-quality, reliable water supplies are critical to the Bay Region's economic prosperity and development. Bay Region water agencies seek to protect the quality and reliability of existing supplies through innovative water management strategies and regional cooperation. These agencies manage a diverse portfolio of water supplies, including groundwater, local surface water, Sierra Nevada water from the Mokelumne and Tuolumne rivers, Delta water from the SWP and the CVP, and recycled water. San Francisco Public Utilities Commission (SFPUC), EBMUD, and SCVWD have critical water interties to deliver water between water systems during emergencies such as earthquakes and wildfires.

SWP contractors and DWR established the Monterey Agreement in 1994 to improve water management flexibility and increase the reliability of SWP deliveries during periods of water shortage. Further details about the Monterey Agreement can be found in DWR Bulletin 132-95 at http://www.dwr.water.ca.gov/swpao/bulletin.cfm.

For an overview of the San Francisco Bay's water flows, see Figure SFB-10.

PLACEHOLDER Figure SFB-10 San Francisco Bay Regional Inflows and Outflows

Surface Water

EBMUD and SFPUC import surface water into the Bay Region from the Mokelumne and Tuolumne rivers via the Mokelumne and Hetch Hetchy aqueducts, respectively. Additional deliveries are made from the SWP's South Bay Aqueduct (SBA) and North Bay Aqueduct (NBA); the CVP's Contra Costa Canal, Putah South Canal, and San Felipe Unit; and Sonoma County Water Agency's (SCWA) Sonoma and Petaluma aqueducts. Reservoirs in the region capture runoff to augment local water supplies and to recharge aquifers. ~~Some reservoirs store water at the terminus of constructed aqueducts, such as the Santa Clara Terminal Reservoir at the terminus of the SBA.~~ Today, about 70 percent of the urban water supply is imported into the Bay Region. Table SFB-7 shows the sources of imported water, the conveyance facilities, and the volume of water that each facility delivered in 2010. Many Bay Region residents get their water from local streams. In the South Bay, local streams supply water to the San Francisco Water Department, ~~the City of San Jose,~~ cities in Alameda County, and to small developments in the surrounding mountains. The Alameda County Water District (ACWD) and Zone 7 Water Agency (Zone 7) recharge their groundwater basins with local streams, as well as with deliveries from the SWP.

Page: 19

14 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 10:09:01 AM
The SBA terminal tank doesn't fit in here with the discussion of local reservoirs that capture runoff.

15 Number: 2 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:05:15 AM
Need to define South Bay. I think it is defined later on as the southern planning area.

16 Number: 3 Author: trachemm Subject: Cross-Out Date: 12/3/2013 10:08:38 AM
Local streams provide water to cities throughout Santa Clara County, not just San Jose

17 Number: 4 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:08:06 AM
and Santa Clara County

18 Number: 5 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:09:31 AM
, Santa Clara Valley Water District (SCVWD),

19 Number: 6 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:10:17 AM
and CVP (for SCVWD).

PLACEHOLDER Figure SFB-13 San Francisco Bay Hydrologic Region Annual Groundwater Supply Trend by Type of Use (2002-2010)

Figure SFB-12 shows that between 2002 and 2010, the annual water supply for the region has fluctuated between approximately 1,380 taf in 2002 and 1,100 taf in 2010. During the same period, the annual groundwater supply has fluctuated between approximately 280 taf in 2008 to 240 taf in 2010, and provided between 18 and 23 percent of the total water supply for the region. Figure SFB-13 indicates that groundwater supply meeting urban use ranged from 60 to 85 percent of the annual groundwater extraction, while groundwater extraction meeting agricultural use ranged from 20 to 35 percent. Groundwater was not used for meeting any managed wetland use.

Recycled Water

Recycled water is used for many applications in the Bay Region, including agriculture, landscape irrigation, commercial and industrial purposes, and wetland replenishment. The region has a large potential market for recycled water — up to 240,000 acre-feet per year by 2025 as reported in the 1999 Bay Area Recycled Water Master Plan. The latest SFRWQCB report states that 58,000 af of water is recycled per year of the approximately 600,000 acre-feet of wastewater generated in the region per year.

The Bay Region has a long history of regional recycled water planning. Following years of drought in the early 1990s, and facing uncertain future water supplies, the Bay Area Clean Water Agencies (BACWA) formed a partnership with the U.S. Bureau of Reclamation (USBR) and DWR to study the feasibility of a regional approach to water recycling. The study produced the Bay Area Regional Water Recycling Program, which is the foundation of regional recycled water planning throughout the Bay Region.

The IRWM planning process has created partnerships among Bay Region agencies to further develop recycled water projects. The San Francisco Bay Area IRWMP and East Contra Costa County (ECCC) IRWMP identify several proposed recycled water projects. Collaboration between the Bay Area and the ECCC IRWM groups intends to develop joint recycled water projects.

[1]Through IRWM, the Bay Area Regional Water Recycling Program Authorization Act was enacted in 2008. This act enabled USBR to fund eight recycled water projects under Title 16. The act also enabled the SCVWD to receive federal stimulus money for two recycled water projects. ~~One project is to improve the South Bay Advanced Recycled Water Treatment Facility, a joint effort between SCVWD and the City of San Jose to treat wastewater byproducts.~~[2]~~The other project is to develop short- and long-term content for SCVWD's South County Recycled Water Master Plan.~~[3]Two additional recycled water treatment facilities were dedicated recently — Las Gallinas Valley Sanitary District's facility on September 25, 2012, in San Rafael; and Novato Sanitary District's facility on October 11, 2012, in Novato.

Desalinated Water

In 2003, the ACWD dedicated the first brackish water desalination facility in Northern California and expanded it in 2010 to double its production capacity to 10 million gallons per day (mgd). The Newark Desalination Facility receives its water from the Niles Cone Groundwater Basin, which contains some brackish water due to previous years of seawater intrusion. This was made possible as a result of ACWD Aquifer Reclamation Program (ARP), which has been working to eliminate seawater intrusion from the Niles Cone Groundwater Basin. Since the facility was completed, ACWD has reported improved water

Page: 22

20 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:16:57 AM
I think the act was independent of IRWM. What is the reference for this?

21 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:21:00 AM
One project is the Silicon Valley Advanced Water Purification Center, a joint effort between SCVWD and the City of San Jose to advance treat recycled water to improve its quality and expand recycled water uses.

22 Number: 3 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:20:40 AM
The other project is in the Central Coast hydrologic region and provided funding to construct additional pipelines to expand the South County Recycled Water Program.

quality and production capacity, reduced reliance on imported supplies, and greater dry year supply reliability.

Another desalination project headed by the Contra Costa Water District (CCWD), EBMUD, SFPUC, and SCVWD has been considered since 2003. In 2010, Zone 7 joined this group. Their research led them to believe a facility could be built at CCWD Mallard Slough Pump Station. In order for it to be viable and reasonable, the group agreed that a 10 to 20 mgd facility would be best. As of 2013, this project is in the planning phase, but progress is being made in the form of studies and simulations.

MMWD is processing a desalination project off the coast of San Rafael. A recent decision by a Court of Appeal upheld the environmental document. Voter approval is needed for financing the planning, design, and permitting. As of 2013, there are no plans to move forward, although this could change depending on other sources of water.

Water Uses

Drinking Water

~~The SFRWQCB works with local water and sanitary districts to reduce the need for water imports by promoting the recycling of wastewater and the collection of stormwater in cisterns, groundwater basins, and local retention basins for safe uses in the Bay Region.~~

The region has an estimated 190 community drinking water systems (Table SFB-10). Over 60 percent are small systems serving fewer than 3,300 people with most of them serving fewer than 500 people. Small water systems face unique financial and operational challenges to provide safe drinking water. With a small customer base, many small water systems cannot develop or access the technical, managerial, and financial resources that they need to comply with new and existing regulations. These water systems may be geographically isolated; and their staff often lacks the time or expertise to make needed infrastructure repairs; install or operate treatment facilities; and develop comprehensive source water protection plans, financial plans, or asset management plans (U.S. Environmental Protection Agency 2012).

PLACEHOLDER Table SFB-10 Community Drinking Water Systems, San Francisco Bay Hydrologic Region

Medium and large community drinking water systems account for less than 40 percent of the region's systems, but deliver drinking water to over 95 percent of the region's population. These water systems generally have financial resources to hire staff that oversees daily operations and maintenance and that plans for future infrastructure replacement and capital improvements to help ensure that existing and future drinking water standards are met.

Municipal Use

About 70 percent of the urban water supply in the Bay Region is imported, and is relatively expensive due to the capital, operation, and maintenance costs of the projects that deliver the water. The high water rates, cool climate, small lot sizes, and high-density developments contribute to relatively low per capita urban water use. The City of San Francisco has a per capita use of around 100 gallons per day (gpd); ACWD, 160 gpd; and MMWD, 145 gpd. In contrast, water use for communities in the warmer Central Valley regions can range from 200 to 300 gpd, most of which is applied to residential landscapes.

Page: 23

23 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:23:55 AM

Categories (drinking water, municipal use, industrial use) don't match typical categories of water use (i.e., residential, CII, landscape).

24 Number: 2 Author: trachemm Subject: Cross-Out Date: 12/3/2013 10:21:57 AM

This text is out of place; it doesn't belong in a drinking water section.

Droughts, climate change, and population growth all could negatively impact the reliability of available water supplies. Local governments have started to require water efficient devices in new construction; and both local governments and water agencies have rebate programs to replace older, less efficient devices such as washing machines and toilets. Some agencies are offering between $0.25 and $1.00 per square foot to remove lawn area. Most water agencies have conservation tips and rebate information on their Web sites., and other Web sites such as www.saveourh2o.org/, and www.h2ouse.org promote water conservation.

Metering water use allows water purveyors to establish tiered rates, which provide customers an incentive to minimize use and avoid the higher tiers. Purveyors also provide public education on water conservation to encourage low water use. Much of the Bay Region is well-developed and is undergoing urban renewal. The older areas of Oakland and San Francisco are being replaced by new construction, which puts into service more water efficient devices.

Industrial Use

Industrial water use varies greatly throughout the Bay Region from as little as 1 percent by SFPUC to as much as 29 percent by CCWD. Despite an increasing population, the region has seen little change in total industrial water use and a reduction in total industry per capita water use over time. Currently, the Delta Diablo Sanitation District provides 8600 acre-feet per year of recycled water to power plants and is looking to supply an additional 12 mgd of recycled water to the Mirant Power Plant. The city of Benicia is undertaking another large industrial project with the Valero Refining Company to supply up to 2 mgd of high purity recycled water to Valero's Benicia refinery for use as cooling tower make-up water. This project would reduce Valero's demand for water from 4,480 to 5600 af per year to as little as 2,240 af per year.

Water Conservation Act of 2009 (SB x7-7) Implementation Status and Issues

Forty-four Bay Region urban water suppliers submitted 2010 urban water management plans to DWR. The urban water management plans include calculations of baseline water use, and set 2015 and 2020 water use targets, as required by the Water Conservation Law of 2009 (SBx7-7). The population-weighted baseline water use in the region is 153 gallons per capita per day, with a 2020 target of 133 gallons per capita per day. Baseline and target data for urban water suppliers in the region are available on DWR's Urban Water Use Efficiency Web site at www.water.ca.gov/wateruseefficiency.

SBx7-7 also required agricultural water suppliers which serve more than 25,000 irrigated acres to prepare and adopt agricultural water management plans by December 31, 2012; and update those plans by December 31, 2015 and every 5 years thereafter. The Bay Region does not have any agricultural water suppliers that serve more than 25,000 acres; so none of them submitted an agricultural water management plan.

Water Balance Summary

The Bay Region consists of two planning areas, which are separated by the natural waterways of the Delta. The North Bay Area (PA 201) lies north of the confluence of the Sacramento and San Joaquin rivers, Suisun Bay, San Pablo Bay, and Golden Gate. The urban applied water ranges between 145 and 160 taf, about two-thirds of which is residential and the remainder commercial and industrial uses. Agricultural applied water averages about 92 taf, depending on the amount of rainfall in a particular year.

Page: 24

25 Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:24:15 AM

or replace

There are three rivers with instream flow requirements in PA 201 — Lagunitas Creek, Milliken Creek, and the San Joaquin River. The instream flows range from 0.4 to 1.5 maf. There are a few managed wetlands using about 1 taf per year. Brackish water that supplies the Suisun Marsh is not accounted for in the Water Balances as this supply is not a freshwater source of supply.

The instream supplies for PA 201 come from local rivers (primarily the San Joaquin River). Much of the urban supply comes from SWP (30-40 taf), federal deliveries (31-38 taf), or are locally imported (20-33 taf). Some groundwater is also extracted (75-100 taf), probably for agricultural use.

The South Bay Planning Area (PA 202) is primarily urban. Urban applied water ranges from about 0.9 to 1.0 maf, with about 60 percent being used for residential interior and exterior and the remainder commercial and industrial. From 60 to 115 taf of urban applied water are recharged into the groundwater basin. Agriculture uses about 20 to 25 taf in the planning area.

Environmental water use consists of about 3 taf annually applied to managed wetlands. There are no instream or wild and scenic requirements in PA 202.

Water supply comes from a variety of sources — locally (90-190 taf), locally imported (420-470 taf), CVP (90-176 taf), SWP (65-160 taf), groundwater (170-180 taf, most or all of which is offset by intentional recharge), reuse (3-25 taf), recycle (27-35 taf), and desalination (1.4 taf annually). Figure SFB-14 and Table SFB-11 shows the Bay Region's water balance for 2001-2010.

PLACEHOLDER Figure SFB-14 San Francisco Bay Hydrologic Region Water Balance by Water Year, 2001-2010

PLACEHOLDER Table SFB-11 San Francisco Bay Hydrologic Region Water Balance Summary for 2001-2010 (thousand acre-feet)

Project Operations

State, federal, and local conveyance systems deliver water to the Bay Region, as described in the Water Supplies section. The water is stored in over 30 reservoirs throughout the region. This section lists some of the larger reservoirs and their capacities, and discusses ongoing seismic retrofits to dams that impound some of the reservoirs.

East Bay Reservoirs

- San Pablo Reservoir (38,600 af)
- Lafayette Reservoir (4,300 af)
- Del Valle Reservoir (77,000 af)
- Lake Anza (268 af)
- Lake Temescal (200 af)
- Lake Chabot (10,280 af)
- Cull Canyon Reservoir (310 af)
- Calaveras Reservoir (100,000 af)

26

Page: 25

Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:24:55 AM

Is this return flows/recharge from irrigation? It would help to clarify.

Santa Clara County Reservoirs

- Almaden Reservoir (~~2,000~~)
- Anderson Reservoir (~~90,000~~)
- Calero Reservoir (~~9,850~~)
- Coyote Reservoir (~~23,666~~)
- Lexington Reservoir (~~21,430~~)
- Stevens Creek Reservoir (~~3,800~~)
- Vasona Reservoir (~~410~~)
- ~~Chesbro Reservoir (3,000 af)~~

Marin County Reservoirs

- Lagunitas Reservoir (341 af)
- Alpine Reservoir (8,892 af)
- Bon-Tempe Reservoir (4,300 af)
- Kent Reservoir (32,900 af)
- Phoenix Reservoir (612 af)
- Nicasio Reservoir (22,400 af)
- Soulajule Reservoir (10,572 af)

SCVWD operates 10 reservoirs for water supply and groundwater recharge. The reservoirs have a total capacity of 169,000 af. The largest is Anderson Reservoir near the City of Morgan Hill with a capacity of 90,000 af. However, five of the reservoirs, including Anderson Reservoir, ~~are kept low while their dams undergo seismic retrofits. Approximately 46,300 af of water storage, 27 percent of the total capacity, is lost during the retrofits which will take years.~~ Additional water storage is lost while SFPUC's Calaveras Dam (100,000 acre-foot capacity) is retrofitted.

Water Quality

The SFRWQCB is the lead agency charged with protecting and enhancing surface water and groundwater quality in the Bay Region. It implements the total maximum daily load (TMDL) Program, which involves determining a safe level of loading for each problem pollutant, determining the pollutant sources, allocating loads to all the different sources, and implementing the load allocations. It is taking a watershed management approach to runoff source issues, including TMDL implementation, by engaging all affected stakeholders in designing and implementing goals on a watershed basis to protect water quality. Representatives from all levels of government, public interest groups, industry, academic institutions, private landowners, concerned citizens, and others are involved in creating watershed action plans. The plans include actions such as improving coordination between regulatory and permitting agencies, increasing citizen participation in watershed planning, improving public education on water quality and protection issues, and prioritizing and enforcing current regulations more consistently.

Surface Water Quality

Despite successful regulation of municipal and industrial wastewater discharges through the National Pollutant Discharge Elimination System (NPDES), many significant surface water quality issues remain to be resolved. Pollutants from urban and rural runoff include pathogens, nutrients, sediments, and toxic residues. Some toxic residues are from past human activities such as mining; industrial production; and the manufacture, distribution, and use of agricultural pesticides. These residues include mercury, PCBs, selenium, and chlorinated pesticides. Emerging pollutants in the region include flame retardants,

Page: 26

27 Number: 1 Author: DeviMody Subject: Sticky Note Date: 12/3/2013 9:31:32 AM
Need to include Guadalupe Reservoir (3,400 af).

28 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:25:57 AM
1,586

29 Number: 3 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:26:08 AM
90,373

30 Number: 4 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:26:21 AM
9,934

31 Number: 5 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:29:48 AM
23,244

32 Number: 6 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:29:59 AM
19,044

33 Number: 7 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:30:07 AM
3,138

34 Number: 8 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:30:18 AM
495

35 Number: 9 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:29:29 AM
Chesbro Reservoir is in the Central Coast Hydrologic Region and protects property in that region.

36 Number: 10 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:26:46 AM
Guadalupe (3,415 af)

37 Number: 11 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:32:45 AM
Chesbro's primary purpose is flood protection, though it does provide water supply benefits. Likewise, the other nine reservoirs' primary purpose is water supply, but they provide other benefits such as flood protection and recreation.

38 Number: 12 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:30:49 AM
owns and

40 Number: 13 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:31:23 AM
, eight of which are in the San Francisco Bay Hydrologic Region.

41 Number: 14 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:32:55 AM
about

42 Number: 15 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:35:40 AM
have operating restrictions totaling 86,533 af (or 51 percent of total capacity) due to seismic concerns. SCVWD is in the process of completing seismic retrofits on most of the dams to remove the operating restrictions.

and other pollutants. Contamination affects the supply of potable water and water for other beneficial uses. Some municipal, domestic, industrial, and agricultural supply wells have been removed from service due to the presence of pollution, mainly in shallow groundwater zones. Overdraft can result in land subsidence and saltwater intrusion, although active groundwater management has stopped or reversed the saltwater intrusion.

A variety of historical and ongoing industrial, urban, and agricultural activities and their associated discharges have degraded groundwater quality. Such discharges include industrial and agricultural chemical spills, underground and above-ground tank and sump leaks, landfill leachate, septic tank failures, and chemical seepage via shallow drainage wells and abandoned wells. The Bay Region has over 800 groundwater cleanup cases, about half of which are fuel cases. In many cases, the treated groundwater is discharged to surface waters via storm drains. High priority cleanup cases include Department of Defense sites such as Hunter's Point, Point Molate, Point Isabel, and the "Brownfields" sites (in general, these are contaminated former industrial sites in urban areas that are suitable for redevelopment).

The SFRWQCB issues NPDES permits for discharge of treated groundwater polluted by fuel leaks and service stations wastes and by volatile organic compounds. It also issues permits for reverse osmosis concentrate from aquifer protection wells, for salinity barrier wells, and for high volume dewatering of structures. As additional discharges are identified, source removal, pollution containment, and cleanup must be undertaken as quickly as possible to ensure that groundwater quality is protected.

Much of the Bay Region's groundwater is considered to be an existing or potential source of drinking water. However, some groundwater is not, such as shallow or saline groundwater around the perimeter of San Francisco Bay. Successful groundwater management in the region ensures that groundwater basins provide high quality water for drinking; irrigation; industrial processes; and the replenishment of streams, wetlands, and San Francisco Bay.

The agencies in the region have implemented various quality programs to monitor and protect groundwater quality. The Sonoma Valley County Sanitation District (SVCSD), Zone 7, and SCVWD are developing Salt and Nutrient Management Plans to ensure that Bay Region groundwater basins are protected, as required by SWRCB's Recycled Water Policy. Also, SVCSD ~~is developing~~ new guidance document to help local water agencies develop their own Salt and Nutrient Management Plans. The goal of the plans is to reduce the salts and nutrients that enter the region's groundwater basins.

Drinking Water Quality

Drinking water in the Bay Region ranges from high-quality Mokelumne River and Tuolumne River water to variable-quality Delta water, which constitutes about one-third of the domestic water supply. Purveyors that depend on the Delta for all or part of their domestic water supply can meet drinking water standards, but still need to be concerned about microbial contamination, salinity, and organic carbon.

The SFRWQCB contributed to the 2012 Draft Report, "Communities that Rely on Contaminated Groundwater", which assesses community drinking water systems in the region. While most community drinking water systems comply with drinking water standards, the report identifies 28 wells in 18 water systems that rely on contaminated groundwater. A well is considered contaminated if a primary drinking water standard is exceeded. Most of the affected systems are small systems which often need financial

Page: 29

43 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:38:30 AM
The discussion in this section seems to focus on point source contamination. There should also be a discussion about nitrate contamination from fertilizers, animal, and septic systems.

44 Number: 2 Author: georcook Subject: Comment on Text Date: 12/5/2013 11:01:58 AM
SCVWD recommends checking this number as according to GeoTracker there are 532 active cases in Santa Clara County (239 open fuel leak sites and 293 other groundwater clean-up sites and 350 active cases in San Mateo County

45 Number: 3 Author: georcook Subject: Inserted Text Date: 12/5/2013 10:54:11 AM
active

46 Number: 4 Author: georcook Subject: Highlight Date: 12/3/2013 12:09:06 PM
Moffett Field,

47 Number: 5 Author: georcook Subject: Highlight Date: 12/3/2013 12:58:50 PM
suggest changing to :....treated groundwater from environmental release sites" as NPDES permits are issued for all sites treating groundwater.

48 Number: 6 Author: trachemm Subject: Comment on Text Date: 12/3/2013 10:54:46 AM
A definition of this term would be helpful.

49 Number: 7 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:55:07 AM
has developed

50 Number: 8 Author: trachemm Subject: Inserted Text Date: 12/3/2013 10:55:37 AM
as part of the 2013 Bay Area IRWM Plan update.

51 Number: 9 Author: trachemm Subject: Highlight Date: 12/3/2013 10:58:51 AM
In this context, municipal might be a better term to use than domestic. Typically, domestic refers to individual private wells rather than large public water supply systems.

52 Number: 10 Author: trachemm Subject: Highlight Date: 12/3/2013 10:56:02 AM

Hydrograph 04N05W02B001M

Hydrograph 04N05W02B001M (Figure SFB-15-C) is from a domestic well located in the southern Sonoma Valley Subbasin, a predominantly agricultural area. The hydrograph illustrates the effect of in-lieu recharge on declining groundwater levels and the associated response when recycled water supplies were made available to the area around 1996. Groundwater levels prior to 1990 were generally stable at around 5 feet above mean sea level, however, dropped to approximately 120 feet below mean sea level by 1996. The drop in groundwater level created a depression zone near the City of Sonoma which caused saline water to migrate northward into the subbasin. In the mid-1990s, the SCWA and the City of Sonoma initiated a saltwater intrusion control program and made recycled water available for irrigation, which offset the need for groundwater pumping for irrigation and allowed groundwater levels to recover. Between 1996 and 1998, groundwater levels recovered 120 feet and have been above mean sea level for more than 10 years. SCWA prepared a Groundwater Management Plan for the Sonoma Valley in 2007 and is proactively pursuing a portfolio of water projects to ensure the sustainability of surface water and groundwater resources in Sonoma County.

Hydrograph LMMW-1S

Hydrograph LMMW-1S (Figure SFB-15-D) is from a monitoring well located in the highly urbanized Westside Basin, and is monitored by the SFPUC. The hydrograph represents generally stable groundwater levels in an urban environment primarily due to non-use of groundwater supply for domestic consumption, as the area is served by surface water supplies. As shown in Table SFB-3 San Francisco County has the least number of well records of counties located in the region, and groundwater within the county is not widely used for domestic, irrigation, public supply, or industrial purposes. Of about 1,550 available well records in the county, about 1,200 (79 percent) are monitoring wells likely associated with groundwater cleanup programs. Because the county is heavily reliant upon imported surface water supplies, SFPUC is developing groundwater resources in the Westside Basin for more reliable groundwater supplies.

Hydrograph 04S01W30E003M

Hydrograph 04S01W30E003M (Figure SFB-15-E) is from a well located in an urban area of the Niles Cone Subbasin. The hydrograph is another illustration of groundwater level recovery resulting from availability of imported surface water supplies and implementation of groundwater recharge efforts. Salt water intrusion was first noticed in the Niles Cone Subbasin in the 1920s, a result of decades of persistent pumping in the area. ACWD began purchasing imported water from the SWP in 1962 to supplement local water supplies and to increase the amount of water available for local groundwater recharge through percolation ponds. The additional water supplies and the groundwater recharge efforts resulted in decreased groundwater pumping and recovering groundwater levels. In the 1970s, ACWD constructed inflatable dams in Alameda Creek to further increase recharge capabilities in the groundwater basin.

Hydrograph 07S01E07R013M

Hydrograph 07S01E07R013M (Figure SFB-15-F) is from a municipal water supply well located in Santa Clara County. The hydrograph is a classic example of how conjunctive management of water supplies help offset the effects of ~~population increase, land use changes, and land subsidence on groundwater levels.~~ The earliest recorded groundwater level is 100 feet above mean sea level in 1915 (not shown in Figure SFB-15-F). By 1935, groundwater levels dropped to approximately 5 feet above mean sea level due to intensified pumping activity. In 1935, SCVWD constructed reservoirs to capture more local surface water which reversed the declining trend in groundwater levels. The groundwater conditions

53 Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:00:16 AM

population increase and land use change on land subsidences and groundwater levels.

improved until mid-1940s when increase in population and a shift in land use again intensified groundwater extraction in the region. By 1964, the groundwater levels decreased to almost 135 feet below mean sea level.

Stress on the groundwater basin first due to intensified pumping and then due to increased population and shift in land use caused land subsidence to become a significant problem in the Santa Clara Valley groundwater basin. A 13-foot subsidence was recorded in San Jose between 1915 and 1970. In 1964, SCVWD began receiving the first deliveries of imported water from the SWP; and in 1987, SCVWD increased its deliveries of imported water from the federal government. Along with increased surface water deliveries, implementing an in-lieu recharge program and technology changes and water conservation programs, SCVWD successfully reversed the downward trend in groundwater levels, halted land subsidence in the area, and stabilized groundwater levels at approximately 100 feet above mean sea level. SCVWD's Groundwater Management Plan of 2001 also set subsidence thresholds. The Groundwater Management Plan has recently been updated for the groundwater subbasins in the Santa Clara Valley Basin managed by SCVWD.

PLACEHOLDER Figure SFB-15 Groundwater Level Trends in Selected Wells in the San Francisco Bay Hydrologic Region

Change in Groundwater Storage

Change in groundwater storage is the difference in stored groundwater volume between two time periods. Examining the annual change in groundwater storage over a series of years helps identify the aquifer response to changes in climate, land use, or groundwater management over time. If the change in storage is negligible over a period represented by average hydrologic and land use conditions, the basin is considered to be in equilibrium under the existing water use scenario and current management practices. However, declining storage over a period characterized by average hydrologic and land use conditions does not necessarily mean that the basin is being managed unsustainably or subject to conditions of overdraft. Utilization of groundwater in storage during years of diminishing surface water supply, followed by active recharge of the aquifer when surface water or other alternative supplies become available, is a recognized and acceptable approach to conjunctive water management. *Additional information regarding the risks and benefits of conjunctive management can be found online in Update 2013, Volume 3, Chapter 9, "Conjunctive Management and Groundwater Storage."*

Because of resource and time constraints, changes in groundwater storage estimates for basins within the region were not developed as part of the groundwater content enhancement for Update 2013. However, some local groundwater agencies within the region periodically develop change-in-groundwater-storage estimates for basins within their service area, for example, Zone 7 Water Agency (http://www.zone7water.com/), SFPUC (http://www.sfwater.org/), and SCVWD (http://www.valleywater.org/).

Flood Management

Major floods occur regularly in the Bay Region. The floods can be from creeks and rivers, local stormwater runoff, or from levee failures. Many streams in the Bay Region flood repeatedly, such as the Napa River, which has flooded Napa Valley several times causing widespread structural losses and agricultural damages. Floods can be flash floods or debris-flow floods and can inundate urban or coastal areas. Flood damage has been recorded in the region since 1861-1862, when the devastating Great Flood

54 Number: 1 Author: georcook Subject: Highlight Date: 12/3/2013 1:02:29 PM

Was updated in 2012

Impacts from sea level rise are most likely to occur in concert with other forces that already contribute to coastal flooding. When superimposed on higher sea levels these conditions will combine to create short-term extremely high water levels that can inflict damage to areas that were not previously at risk. For example, computer models indicate that a one-foot rise in sea level will increase the likelihood that the most extreme storm surge event which now occurs once a century, will occur once every 10 years. While storm impacts cannot be mapped as easily as sea level rise can, it is likely that larger areas will flood during future storm events.

Sea level rise will affect and threaten coastal communities, facilities and infrastructure through more frequent flooding and gradual inundation, as well as increased erosion of coastal bluffs, and river surges affecting local flooding. This will affect roads, utilities, wastewater treatment plants, outfalls, and storm water facilities and systems as well as large wetland areas in addition to towns and cities. Where land is rising — tectonic effects — the rate of sea level rise may be exceeded by the rate of coastal uplift. However, in the North Coastal area the rate of tectonic uplift is greater than current rate of sea level rise.

The risk assessment for flooding is incorporating the vulnerability of the North Coast region based on the rate and magnitude of sea level rise and its impacts. Those communities and facilities at risk are incorporating hazard mitigation measures into planning and management strategies. As the California Flood Futures report identifies, the first strategy is to identify and evaluate sea level rise risks and determine the areas that are most vulnerable to future flooding, inundation, erosion and wave impacts, and to develop hazard mitigation and adaptation plans.

Where coastal bluff erosion is high, coastal cliff retreat is dramatic with collapsed roadways, undermined foundations, dangling decks and stairways and structures. Coastal erosion tends to be episodic, with long-term cliff and bluff failure occurring during a few severe storm events. Scientists consider the probability that these events will increase in frequency and intensity. The California Coastal Commission database for coastal erosion is a valuable resource and available on CD (Dare 2005). A key component to coastal management is understanding the adaptive capacity of the affected areas. This capacity is the ability to prepare for, respond to, and recover from sea level rise impacts.

Damage Reduction Measures

Structural Measures

Structural flood damage reduction measures in the Bay Region are generally local in scope rather than part of a large-scale flood protection system. Important structural measures in the region, such as reservoirs, levees, and channel improvements, protect life and property from the consequences of high water and debris flow.

Three important reservoirs in the region have a designated flood protection function — ~~Lake Chesbro,~~ Lake Del Valle, and Cull Creek Reservoir with ~~5,000;~~ 38,000; and 310 af of flood control capacity, respectively. ~~SCVWD constructed Lake Chesbro to protect San Jose.~~ Lake Del Valle is a SWP facility that protects Pleasanton, Fremont, Niles, and Union City. Alameda County Flood Control and Water Conservation District (Alameda County FCWCD) constructed Cull Creek Reservoir to protect Castro Valley.

Operation of the reservoirs is not coordinated according to any formal agreement. Each reservoir is operated according to its flood control diagram, which dictates the required flood space reservation

Page: 35

55 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:01:33 AM
Chesbro Reservoir is in the Central Coast region. Provides protection for southern Santa Clara County and not San Jose.

56 Number: 2 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:00:34 AM

57 Number: 3 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:00:41 AM

Eastern Contra Costa County, but a small portion of the group is within the Bay Region boundary. These groups develop IRWM plans, which are living documents that change as planning efforts mature, opportunities for collaboration and partnership are discovered, and State guidance is refined further. The water management priorities and stakeholder relationships of each group are unique, and they are committed to meeting regional water needs. The diverse stakeholder groups recognize that more regional or subregional collaboration is needed.

PLACEHOLDER Figure SFB-18 Integrated Regional Water Management Groups in the San Francisco Bay Hydrologic Region

San Francisco Bay Area IRWM Group

The Bay Area IRWM Group ~~is developing~~ important water management information to update its IRWM Plan, which was an important resource for this San Francisco Bay Regional Report. The IRWM Plan addresses 16 IRWM Plan Standards, including resource management strategies and climate change, which are discussed in the Looking to the Future chapter.

The Bay Area IRWM Group was formed through a collaborative process beginning in 2004. The original group participants include:

- Alameda County Water District
- Association of Bay Area Governments
- Bay Area Clean Water Agencies
- Bay Area Water Supply and Conservation Agency
- Contra Costa County Flood Control and Water Conservation District
- Contra Costa Water District
- East Bay Municipal Utility District
- Marin Municipal Water District
- City of Napa
- North Bay Watershed Association
- City of Palo Alto
- San Francisco Public Utilities Commission
- City of San Jose
- Santa Clara Basin Watershed Management Initiative
- Santa Clara Valley Water District
- Solano County Water Agency
- Sonoma County Water Agency
- Sonoma Valley County Sanitation District
- State Coastal Conservancy
- Zone 7 Water Agency

The group is organized into four Functional Areas:

1. Water Supply & Water Quality
2. Wastewater & Recycled Water
3. Flood Protection & Stormwater Management
4. Watershed Management & Habitat Protection and Restoration

Page: 39

58 Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:01:50 AM
and implement

59 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:02:12 AM
developed

Representatives from agencies that were active in the Functional Areas formed a Coordinating Committee (CC), which serves as the governing body of the group and provides oversight for updating the IRWM Plan. The CC now includes representatives from Bay Area water supply agencies, wastewater agencies, flood control agencies, ecosystem management and restoration agencies, regulatory agencies, nongovernmental organizations, and members of the public.

The CC provides opportunities for all stakeholders and interested parties to participate in the Bay Area IRWM Group and its update to the IRWM Plan. Stakeholders include water supply agencies, recycled water and wastewater agencies, stormwater and flood control agencies, utilities, watershed and habitat conservation groups, regulatory agencies, disadvantaged communities, Native Americans, environmental justice groups and communities, industrial and agricultural organizations, park districts, educational institutions, well owners, developers and landowners, elected representatives, adjacent IRWM groups, municipalities and local governments, and State and federal agencies.

The CC has developed east, west, south, and north subregion groups because integrated water management throughout the Bay Region is challenging and can be more effective by dividing the region based on demographics and geography. The subregion groups provide stakeholder outreach and project solicitation for integration into the IRWM Plan.

The CC also has established four subcommittees to accomplish specific tasks for the Bay Area IRWM Group. These subcommittees include:

1. The Plan Update Team (PUT), which is the primary work group for the IRWM Plan Update.
2. The Project Screening Subcommittee, which works with the subregion groups to obtain project proposals, reviews the proposals to ensure that they are in accordance with DWR guidelines, and identifies synergies and encourages collaboration.
3. The Website and Data Management Subcommittee, which ensures that the Web site is a reasonable communication and information tool for CC members and stakeholders, and ensures that data are consistent with State requirements.
4. The Planning and Process Subcommittee, which analyzes issues and performs specific work tasks as needed, and recommends potential actions to the CC.

~~Through its subregions, the CC has solicited stakeholders for potential projects that support DWR's IRWM Guidelines and the goals and objectives of the Bay Area IRWM Plan. A list of over 330 potential projects was compiled, including over 120 projects proposed to benefit disadvantaged communities. The projects were reviewed and scored according to a sophisticated scoring methodology that assigns projects into one of three tiers. The 50 highest scoring projects were placed in the top tier and are a priority to construct. The Bay Area IRWM Group is proposing to implement 19 of these projects soon with the help of $20 million in Proposition 84 Implementation Grant funding. See Project Implementation for more information on the 19 projects. Also see http://bairwmp.org/projects for full descriptions and scores of all potential projects.~~

The CC has achieved consensus on all issues requiring a decision. However, if the CC is not able to reach consensus on an issue, then a vote may be taken. Twelve members vote — three members from each of the four Functional Areas.

60 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:02:43 AM

This seems like it belongs in the Regional Planning section.

State Funding Received

The Bay Region has received millions of dollars in State funding to implement IRWM projects since *California Water Plan Update 2009.* This funding includes Proposition 84 and Proposition 1E grant funding. Some noteworthy IRWM projects receiving these funds include:

Proposition 84

- **Mokelumne Aqueduct Interconnection Project (EBMUD; $10 million Interregional Grant).** This project improves the reliability of the Mokelumne Aqueducts by interconnecting them on both sides of the Delta. The interconnections maximize transmission capacity should one or two of the aqueducts be damaged by earthquake or flood in the Delta. Surviving portions of the aqueducts could convey water after a major event until repairs could be made. A 10-mile above-ground portion of the aqueducts is especially vulnerable to damage in the Delta.
- **Bay Area Regional Priority Projects (BACWA; $30,093,592 Implementation Grant).** This consortium of projects incorporates a wide range of water management elements and addresses all of the regional objectives set forth in the San Francisco Bay Area IRWMP. The 23 projects consist of 3 green infrastructure projects, 7 recycled water projects, 3 wetland ecosystem restoration projects, a water conservation project, and 9 integrated projects in DACs (water quality, flood management, ecosystem restoration).

Proposition 1E

- **Phoenix Lake IRWM Retrofit (Marin County FCWCD; $7.661 million Stormwater Flood Management Grant).** This project helps provide 100-year flood protection in Ross Valley, improves aquatic conditions for anadromous salmonids, and enhances public enjoyment of Phoenix Lake.
- **San Francisco Stormwater and Flood Management Priority Projects (SFPUC; $24.147 million Stormwater Flood Management Grant).** These projects are the Sunnydale Flood and Stormwater Management Sewer Improvement Project and the Cesar Chavez Street Flood and Stormwater Management Sewer Improvement Project. The projects improve San Francisco's aging combined sewer system by replacing and installing new sewer lines, which reduces flood damages and improves water quality by increasing the volume of flow receiving secondary treatment before being discharged into San Francisco Bay.
- **Lower Silver Creek and Lake Cunningham Flood Protection Project (SCVWD; $25 million Stormwater Flood Management Grant).** This project consists of channel improvements and modifications at Lake Cunningham to remove 3,800 homes along Lower Silver Creek from the 100-year floodplain. Other project benefits include fewer channel bank failures, enhanced habitat and vegetation, enhanced fish passage, improved water quality, and new recreational amenities for low-income and minority neighborhoods.
- **San Francisquito Creek Flood Protection and Ecosystem Restoration Capital Improvement Project, East Bayshore Road to San Francisco Bay (San Francisquito Creek JPA; $8 million Stormwater Flood Management Grant).** This project protects more than 1,100 properties from creek flooding when a 100-year flood occurs coincident with a 100-year tide and 26 inches of projected sea level rise.

61 Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:05:10 AM

regional

Valley Project, which now diverts significantly less water following Federal Energy Regulation Commission relicensing.

The SWP delivers water through the NBA to Solano County Water Agency and Napa County FCWCD. The NBA extends more than 27 miles from Barker Slough to the Napa Turnout in southern Napa County. The maximum SWP entitlement is 67 taf annually. Solano County Water Agency also gets water from Putah Creek (Lake Berryessa) via the Putah South Canal, a major component of USBR's Solano Project. The project began operating in 1959 and delivers a dependable annual supply of 207 taf; much of which is for agricultural users in the Sacramento River Region.

The City of Vallejo obtained a water right during World War II to divert Sacramento River water from Cache Slough to supply the city and for National Defense needs. The aging diversion facilities became increasingly costly to maintain so the city opted to purchase capacity in the NBA when it was being developed. Vallejo Permit Water now is diverted from Barker Slough along with the other NBA water. The average annual diversion is 22,500 af. The old Cache Slough facilities were not abandoned and could be used for future diversions.

The southern and eastern areas of the Bay Region import water from the Mokelumne and Tuolumne rivers, the Contra Costa Canal (CVP), the San Felipe Unit (CVP), and the SBA (SWP). EBMUD delivers Mokelumne River water to much of Alameda and Contra Costa counties through three pipelines, which serve 1.34 million people with an annual water supply of about 201 taf (2010 census). EBMUD also contracts with USBR to divert Sacramento River water at the Freeport Regional Water Facility to provide water for its customers during drought. SFPUC delivers Tuolumne River water to the City and County of San Francisco via the 150-mile-long Hetch Hetchy Aqueduct. It also sells water wholesale to 28 water districts; cities; and local agencies in Alameda, Santa Clara, and San Mateo counties. A total of approximately 250 taf is delivered and sold annually.

The CCWD delivers CVP water through the Contra Costa Canal. The source of the water can be Rock Slough, Mallard Slough, Old River, Sacramento River, or Victoria Canal. CCWD has a 40-year contract for 195 taf annually. Approximately 550,000 people receive the water; mostly in eastern Contra Costa County; but some people are in the San Joaquin River Hydrologic Region. CCWD also has its own water right to divert water from the Delta.

SCVWD serves ~~1.7~~ [1]million people [2]through the CVP's San Felipe Unit under a contract for 152,500 af annually. The keystone of the San Felipe Unit is San Luis Reservoir.

SWP water is conveyed via the SBA to SCVWD, Zone 7, and ACWD. The SBA is over 42 miles long from the South Bay pumping plant at Bethany Reservoir to the Santa Clara Terminal Facility. The SWP water is used in the South Bay for groundwater recharge; and for municipal, industrial, and agricultural purposes. See Figure SFB-20 for a graphical depiction of Bay Region water imports, as well as Sacramento and San Joaquin River inflows and Pacific Ocean outflow.

PLACEHOLDER Figure SFB-20 Water Imports to the San Francisco Bay Hydrologic Region

62 Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:05:24 AM

1.8

63 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:06:04 AM

, in part

Present sea level rise projections suggest that global sea levels in the 21st century can be expected to be much higher than the recorded increase rise since 1854 of 7.6 inches. These projections are summarized in the State of California Sea-Level Rise Guidance Document (Ocean Protection Council 2013)

Conjunctive Management and Groundwater Storage

Conjunctive management, or conjunctive use, refers to the coordinated and planned use and management of both surface water and groundwater resources to maximize the availability and reliability of water supplies in a region to meet various management objectives. Managing both resources together, rather than in isolation, allows water managers to use the advantages of both resources for maximum benefit.

A survey undertaken in 2011-2012 jointly by DWR and ACWA to inventory and assess conjunctive management projects in California is summarized in Box SFB-5. More detailed information about the survey results and a statewide map of the conjunctive management projects and operational information, as of July 2012, is available online in *Update 2013, Volume 4, Reference Guide, the article "California's Groundwater Update 2013*."

PLACEHOLDER SFB-5 Statewide Conjunctive Management Inventory Effort in California

Conjunctive Management Inventory Results

Of the 89 agencies or programs identified as operating a conjunctive management or groundwater recharge program in California, four are located in the San Francisco Bay Hydrologic Region. These four agencies have implemented various conjunctive management programs to optimize the use of groundwater and surface water resources. The earliest reported conjunctive use project in the region was in the 1920s by SCVWD. Zone 7 Water Agency began its conjunctive management program in 1962, followed by ACWD in 1996 and EBMUD in 2009. The responses to the conjunctive management survey from agencies in the region were incomplete. The information provided by each of the four agencies in the region is summarized below.

SCVWD operates multiple spreading basins for direct percolation of surface water in the Santa Clara Valley basin. The source of their recharge supplies includes water from the SWP, CVP, ~~recycled water,~~ and local surface water. Although capital costs to develop the projects were not reported, SCVWD indicated that operating costs of their conjunctive management program totaled approximately $3 million annually. ~~One of the objectives of the conjunctive management survey was to gather information on the put-and-take capacity as well as the total storage capacity of the conjunctive management programs; unfortunately, this effort was largely unsuccessful due to a lack of response.~~ SCVWD reported data for a single year (2010) — 104,000 af of water was used for local groundwater recharge programs and 52,000 af of water was banked with Semitropic Water Storage District in the Tulare Lake Hydrologic Region. According to the Bay Area IRWMP, SCVWD's integrated water system includes 10 reservoirs, 17 miles of canals, 4 water supply diversion dams, 300 acres of recharge ponds, and 91 miles of controlled in-stream recharge (Bay Area Integrated Regional Water Management Plan 2013).

Zone 7 Water Agency operates spreading basins for direct percolation into the Livermore Valley Basin using water from the SBA and from local sources. The groundw basin that Zone 7 Water Agency manages has a total capacity of 126,000 af. In addition to recharging local aquifers, Zone 7 Water Agency indicated that it had additional capacity with Semitropic Water Storage District (78,000 af) and Cawelo Water District (120,000 af) in Kern County for banking purposes.

64 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:06:24 AM

65 Number: 2 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:19:58 AM

What projects are you interested in? The cost to construct the reservoirs in the 1930s and the 1950s? Our share of the SWP and CVP that is used for groundwater recharge? The cost to construct some of the recharge ponds/canals that were built before we were an agency? The costs of the turnouts into streams we use for recharge? The costs for our treatment plants that provide in-lieu recharge? This is a complicated questions, so it isn't easy to say $XXXX million. The replacement value of water supply system is estimated at over $3 billion. We have a 5-year capital improvement program of $1 billion. We have ongoing operations costs of about $150 million per year.

66 Number: 3 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:10:44 AM

Please reword this. If we didn't provide the information, it was because we didn't know what DWR was looking for. We responded, but apparently our response was incomplete because it was unclear what DWR was requesting.

67 Number: 4 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:21:36 AM

The District's 2012 groundwater management plan (http://www.valleywater.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8467) has 10-year averages of recharge and pumping.

ACWD reported that its groundwater-related programs in the Niles Cone Subbasin had an annual operating cost of $278,000; no capital costs were provided. The Bay Area IRWMP stated that ACWD used a series of former quarry pits to recharge groundwater; however, ACWD in response to the DWR/ACWA survey reported that it had a secured capacity of 150,000 af with Semitropic Water Storage District in Kern County.

EBMUD operates an aquifer storage and recovery (ASR) program in the East Bay Plain Subbasin as part of its Bayside Groundwater Project. The current project output of EBMUD's ASR program is variable, but the program has the capacity to inject up to 1 million gallons per day into a confined aquifer and make the same quantity available to customers during dry years.

~~None of the above agencies provided any information about project development cost, program goals and objectives, and constrains relative to the development of their respective conjunctive management or the groundwater banking programs.~~

Additional information regarding conjunctive management in California as well as discussion on associated benefits, costs, and issues can be found online from Update 2013, Volume 3, Chapter 9, "Conjunctive Management and Groundwater Storage."

Drought Planning

Many of the water suppliers in the Bay Region have urban water management plans, in accordance with the 1983 California Urban Water Management Planning Act. Suppliers such as SFPUC and EBMUD have urban water management plans, which contain strategies to address drought. These strategies include developing alternative dry-year water supply options, adopting water shortage allocation plans, and being prepared for catastrophic water supply interruptions.

Looking to the Future

Future Conditions

Future Scenarios

Update 2013 evaluates different ways of managing water in California depending on alternative future conditions and different regions of the state. The ultimate goal is to evaluate how different regional response packages, or combinations of resource management strategies from Volume 3, perform under alternative possible future conditions. The alternative future conditions are described as future scenarios. Together the response packages and future scenarios show what management options could provide for sustainability of resources and ways to manage uncertainty and risk at a regional level. The future scenarios are composed of factors related to future population growth and factors related to future climate change. Growth factors for the San Francisco Bay region are described below. Climate change factors are described in general terms in Chapter 5, Volume 1.

Water Conservation

The water plan scenario narratives include two types of water use conservation. The first is conservation that occurs without policy intervention (called background conservation). This includes upgrades in plumbing codes and end user actions such as purchases of new appliances and shifts to more water

68 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:22:27 AM

Again, please reword. It wasn't clear what DWR was requesting/needed.

runoff to replicate pre-development hydrology. It promotes using natural on-site features to protect water quality and detain runoff.

Pollution Prevention

The SFRWQCB adopts TMDLs for Bay Region watersheds to limit pollutants that impair water quality (primarily sediments, pathogens, nutrients, mercury, polychlorinated biphenyls, and urban pesticides). The TMDLs are designed to help the region meet its goals of protecting and restoring waters, and improving watershed and habitat management by attaining water quality standards.

Climate Change

~~For over two decades, the State and federal governments have been preparing for climate change effects on natural and built systems with a strong emphasis on water supply. Climate change is already impacting many resource sectors in California, including water, transportation and energy infrastructure, public health, biodiversity, and agriculture (U.S. Global Change Research Program 2009; California Natural Resources Agency 2009). Climate model simulations based on the Intergovernmental Panel on Climate Change's 21st century scenarios project increasing temperatures in California, with greater increases in the summer. Projected changes in annual precipitation patterns in California will result in changes to surface runoff timing, volume, and type (Cayan 2008). Recently developed computer downscaling techniques indicate that California flood risks from warm-wet, atmospheric river type storms may increase beyond those that we have known historically, mostly in the form of occasional more-extreme-than-historical storm seasons (Dettinger 2011).~~

~~Currently, enough data exists to warrant the importance of contingency plans, mitigation (reduction) of GHG emissions, and incorporating adaptation strategies; methodologies and infrastructure improvements that benefit the region at present and into the future. While the State is taking aggressive action to mitigate climate change through GHG reduction and other measures (California Air Resources Board 2008), global impacts from carbon dioxide and other GHGs that are already in the atmosphere will continue to impact climate through the rest of the century (Intergovernmental Panel on Climate Change 2007).~~

~~Resilience to an uncertain future can be achieved by implementing adaptation measures sooner rather than later. Because of the economic, geographical, and biological diversity of California, vulnerabilities and risks from current and future anticipated changes are best assessed on a regional basis. Many resources are available to assist water managers and others in evaluating their region-specific vulnerabilities and identifying appropriate adaptive actions. (U.S. Environmental Protection Agency and California Department of Water Resources 2011; California Emergency Management Agency and California Natural Resources Agency 2012).~~

Observations

The region’s observed temperature and precipitation vary greatly due to complex topography. Regionally specific temperature data can be retrieved through the Western Regional Climate Center (WRCC). The WRCC has temperature and precipitation data for the past century. Through an analysis of National Weather Service Cooperative Station and PRISM Climate Group gridded data, scientists from the WRCC have identified 11 distinct regions across the state for which stations located within a region vary with one another in a similar fashion. These 11 climate regions are used when describing climate trends within the state (Abatzoglou et al. 2009). DWR’s hydrologic regions, however, do not correspond directly to

69

Page: 57

Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:23:35 AM

Too general for a regional report. Suggest summarizing briefly and referencing another volume/volumes of the CWP.

majority of the imported water originates in the Sierra Nevada. The Sierra Nevada snowpack is expected to continue to decline as warmer temperatures raise snow levels, reduce spring snowmelt, and increase winter runoff; reducing water supplies for over 7 million people and agriculture in the region. The Sierra Nevada is projected to experience a 48 to 65 percent reduction of its historical average snowpack by the end of this century (van Vuuren et al. 2011).

Coastal observations and global model projections indicate that the California coast and estuaries will experience increasing mean sea levels during the next century, which will significantly affect development and infrastructure in the Bay Region. Mean sea levels are projected to rise 5 to 24 inches (12-61cm) by 2050 and 17 to 66 inches (42-167 cm) by 2100 (National Research Council 2012). A 55-inch rise in mean sea level would place an estimated 270,000 people in the Bay Area at risk from flooding; 98 percent more than are currently at risk; and put an estimated $62 billion worth of shoreline development at risk; including major transportation infrastructure such as rail lines, freeways, and airports (Bay Conservation and Development Commission 2011). Also, the expected increase in both the intensity and frequency of storms will increase the risk of flooding in the Bay Region, from both larger storm surges and greater stream runoff.

Climate changes also are expected to substantially alter the Bay ecosystem. Wetland and transitional habitats will be vulnerable to inundation, erosion, and changes in sediment supply. The highly developed shoreline will constrain the ability of these habitats to migrate landward (Bay Conservation and Development Commission 2011). These habitat changes, along with changes to freshwater inflow and water quality, will impact the species composition in the Bay.

Adaptation

~~Climate change has the potential to impact the region, which the state depends upon for its economic and environmental benefits. These changes will increase the vulnerability of natural and built systems in the region. Impacts to natural systems will challenge aquatic and terrestrial species with diminished water quantity and quality, and shifting eco-regions. Built systems will be impacted by changing hydrology and runoff timing, loss of natural snowpack storage, making the region more dependent on surface storage in reservoirs and groundwater sources. Increased future water demand for both natural and built systems may be particularly challenging with less natural storage and less overall supply.~~

~~Water managers and local agencies must work together to determine the appropriate planning approach for their operations and communities. While climate change adds another layer of uncertainty to water planning, it does not fundamentally alter the way water managers already address uncertainty (U.S. Environmental Protection Agency and California Department of Water Resources 2011). However, stationarity (the idea that natural systems fluctuate within an unchanging envelope of variability) can no longer be assumed, so new approaches will likely be required (Milly et.al. 2008)~~

~~IRWM planning is a framework that allows water managers to address climate change on a smaller, more regional scale. Climate change now is a required component of all IRWM plans (California Department of Water Resources 2010). IRWM regions must identify and prioritize their specific vulnerabilities to climate change, and identify the adaptation strategies that are most appropriate. Planning and adaptation strategies that address the vulnerabilities should be proactive and flexible, starting with proven strategies that will benefit the region today, and adding new strategies that will be resilient to the uncertainty of climate change.~~

70

Page: 59

Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:24:30 AM

Too general. Summarize and reference other volumes of the CWP.

~~Local agencies, as well as federal and State agencies, face the challenge of interpreting climate change data and determining which methods and approaches are appropriate for their planning needs. The Climate Change Handbook for Regional Water Planning (U.S. Environmental Protection Agency and California Department of Water Resources 2011) provides an analytical framework for incorporating climate change impacts into a regional and watershed planning process, and considers adaptation to climate change. The handbook provides guidance for assessing the vulnerabilities of California's watersheds and regions to climate change impacts, and prioritizing these vulnerabilities.~~

Numerous efforts in the Bay Region are addressing climate change. Two recent policy efforts include the BCDC Climate Change Bay Plan Amendment, and the California Coastal Conservancy Climate Change Policy and Project Selection Criteria. Planning efforts in the region include the Bay Area IRWM Plan Update; the San Francisco Estuary Institute (SFEI) *Baylands Ecosystem Habitat Goals Climate Change Technical Update*; and the Plan Bay Area Project, which links land-use and transportation planning in the region. Numerous studies and pilot projects also are under way, including Adapting to Rising Tides, Our Coast Our Future, San Francisco Living Shoreline, San Francisco Estuary Pilot, and the Innovative Wetland Adaptive Techniques in Lower Madera Creek Project. Collaborative groups such as the Bay Area Ecosystem Climate Change Consortium, the North Bay Climate Adaptation Initiative, and the San Francisco Conservations Commons also are working to bring together technical experts, scientists, natural resource managers, and policymakers to better understand and address the impacts of climate change on Bay Area ecosystems and communities.

The Bay Region contains a diverse landscape with different climate zones, which makes finding one adaptation strategy that works throughout the region difficult. Water managers and local agencies must work together to determine the appropriate adaptation strategy and planning approach for their community. Whatever approach is used, water managers and communities must implement adaptation measures sooner rather than later to be prepared for an uncertain future.

~~The State of California has developed additional tools and resources to assist resource managers and local agencies in adapting to climate change, including:~~

- ~~California Climate Adaptation Strategy (2009) — California Natural Resources Agency (CNRA) at: http://www.climatechange.ca.gov/adaptation/strategy/index.html~~
- ~~California Climate Adaptation Planning Guide (2012) — California Emergency Management Agency (Cal EMA) and CNRA at: http://resources.ca.gov/climate_adaptation/local_government/adaptation_policy_guide.html~~
- ~~Cal-Adapt Web site at: http://cal-adapt.org/~~
- ~~Urban Forest Management Plan (UFMP) Toolkit — sponsored by the California Department of Forestry and Fire Management at: http://ufmptoolkit.com/~~
- ~~California Climate Change Portal at: http://www.climatechange.ca.gov/~~
- ~~DWR Climate Change Web site at: http://www.water.ca.gov/climatechange/resources.cfm~~
- ~~The Governor's Office of Planning and Research (OPR) Web site at: http://www.opr.ca.gov/m_climatechange.php~~

Many of the resource management strategies found in Volume 3 not only assist in meeting water management objectives, but also provide benefits for adapting to climate change. These strategies include:

Page: 60

71 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:24:00 AM

72 Number: 2 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:24:39 AM

types are available in this region. Some water types flow by gravity to the delivery location and therefore do not require any energy to extract or convey (represented by a white light bulb).

PLACEHOLDER Figure SFB-23 Energy Intensity of Raw Water Extraction and Conveyance in the San Francisco Bay Hydrologic Region

Recycled water and water from desalination used within the region are not show in Figure SFB-23 because their energy intensity differs in important ways from those water sources. The energy intensity of both recycled and desalinated water depend not on regional factors but rather on much more localized, site, and application specific factors. Additionally, the water produced from recycling and desalination is typically of much higher quality than the raw (untreated) water supplies evaluated in Figure SFB-23. For these reasons, discussion of energy intensity of desalinated water and recycled water are included in Volume 3, Resource Management Strategies.

Energy intensity, sometimes also known as embedded energy, is the amount of energy needed to extract and convey an acre-foot of water from its source (e.g. groundwater or a river) to a delivery location, such as a water treatment plant or a SWP delivery turnout. (Extraction refers to the process of moving water from its source to the ground surface. Many water sources are already at ground surface and require no energy for extraction, while others like groundwater or seawater for desalination require energy to move the water to the surface. Conveyance refers to the process of moving water from a location at the ground surface to a different location, typically but not always a water treatment facility. Conveyance can include pumping of water up hills and mountains or can occur by gravity). EI should not be confused with total energy—that is, the amount of energy (e.g. kWh) required to deliver all of the water from a water source to customers within the region. EI focuses not on the total amount of energy used to deliver water, but rather the energy required to deliver a single unit of water (in kWh/acre-foot). In this way, energy intensity gives a normalized metric which can be used to compare alternative water sources.

~~In most cases, this information will not be of sufficient detail for actual project level analysis. However, these generalized, region-specific metrics provide a range in which energy requirements fall. The information can also be used in more detailed evaluations using tools such as WeSim (http://www.pacinst.org/publication/wesim/) that allows modeling of water systems to simulate outcomes for energy, emissions, and other aspects of water supply selection. It's important to note that water supply planning must take into consideration a myriad of different factors in addition to energy impacts: costs, water quality, opportunity costs, environmental impacts, reliability, and other many other factors.~~

~~EI is closely related to GHG emissions, but not identical, depending on the type of energy used (see *California Water Today, Water-Energy, Volume 1*). In California, generation of one megawatt-hour (MWh) of electricity results in the emission of about a third of a metric ton of GHG, typically referred to as carbon dioxide equivalent or CO_2e (eGrid 2012). This estimate takes into account the use of GHG-free hydroelectricity, wind, and solar and fossil fuel sources like natural gas and coal. The GHG emissions from a specific electricity source may be higher or lower than this estimate.~~

~~Reducing GHG emissions is a State mandate. Water managers can support this effort by considering EI factors, such as those presented here, in their decision-making process. Water use efficiency and related best management practices can also reduce GHGs (See *Volume 3, Resource Management Strategies*).~~

73

Page: 62

Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:25:15 AM

~~Accounting for Hydroelectric Energy~~

~~Generation of hydroelectricity is an integral part of many of the state's large water projects. In 2007, hydroelectric generation accounted for nearly 15 percent of all electricity generation in California. The SWP, CVP, Los Angeles Aqueduct, Mokelumne Aqueduct, and Hetch Hetchy Aqueducts all generate large amounts of hydroelectricity at large multi-purpose reservoirs at the heads of each system. In addition to hydroelectricity generation at head reservoirs, several of these systems also generate hydroelectric energy by capturing the power of water falling through pipelines at in-conduit generating facilities. (In-conduit generating facilities refer to hydroelectric turbines that are placed along pipelines to capture energy as water runs downhill in a pipeline [conduit].) Hydroelectricity is also generated at hundreds of smaller reservoirs and run-of-the-river turbine facilities.~~

~~Hydroelectric generating facilities at reservoirs provide unique benefits. Reservoirs like the SWP's Oroville Reservoir are operated to build up water storage at night when demand for electricity is low, and release the water during the daytime hours when demand for electricity is high. This operation, common to many of the state's hydropower reservoirs, helps improve energy grid stabilization and reliability and reduces GHG emissions by displacing the least efficient electricity generating facilities. Hydroelectric facilities are also extremely effective for providing back-up power supplies for intermittent renewable resources like solar and wind power. Because the sun can unexpectedly go behind a cloud or the wind can die down, intermittent renewables need back up power sources that can quickly ramp up or ramp down depending on grid demands and generation at renewable power installations.~~

~~Despite these unique benefits and the fact that hydroelectric generation was a key component in the formulation and approval of many of California's water systems, accounting for hydroelectric generation in EI calculations is complex. In some systems like the SWP and CVP, water generates electricity and then flows back into the natural river channel after passing through the turbines. In other systems like the Mokelumne aqueduct, water can leave the reservoir by two distinct outflows, one that generates electricity and flows back into the natural river channel and one that does not generate electricity and flows into a pipeline flowing into the EBMUD service area. In both these situations, experts have argued that hydroelectricity should be excluded from EI calculations because the energy generation system and the water delivery system are in essence separate (Wilkinson 2000).~~

~~DWR has adopted this convention for the EI for hydropower in the regional reports. All hydroelectric generation at head reservoirs has been excluded from Figure SFB-22. Consistent with Wilkinson (2000) and others, DWR has included in-conduit and other hydroelectric generation that occurs as a consequence of water deliveries, such as the Los Angeles Aqueduct's hydroelectric generation at San Francisquito, San Fernando, Foothill and other power plants on the system (downstream of the Owen's River Diversion Gates). DWR has made one modification to this methodology to simplify the display of results: EI has been calculated at each main delivery point in the systems; if the hydroelectric generation in the conveyance system exceeds the energy needed for extraction and conveyance, the EI is reported as zero (0). That is, no water system is reported as a net producer of electricity, even though several systems do produce more electricity in the conveyance system than is used (e.g., Los Angeles Aqueduct, Hetch Hetchy Aqueduct).(*For detailed descriptions of the methodology used for the water types presented, see Technical Guide, Volume 5*).~~

Page: 63

74 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:25:41 AM

Shorten and reference of volumes of the CWP.

Table SFB-1 Water Governance, San Francisco Bay Hydrologic Region

Local Water Supply Agencies
Alameda County Water District, Contra Costa Water District, East Bay Municipal Utility District, Marin Municipal Water District, City of Napa, San Francisco Public Utilities Commission, Santa Clara Valley Water District, Solano County Water Agency, Sonoma County Water Agency, Zone 7 Water Agency, Hetch Hetchy Water and Power
Local Wastewater Management Agencies
Fairfield-Suisun Sewer District, Napa Sanitation District, North San Mateo Sanitation District, Novato Sanitary District, San Mateo County, Sausalito/Marin City Sanitary District, Sewage Agency of Southern Marin, Stege Sanitary District, Town of Yountville, Vallejo Sanitation & Flood Control District, West Bay Sanitary District [1]
State Government Agencies
California Department of Water Resources, State Water Resources Control Board, San Francisco Regional Water Quality Control Board, California Department of Public Health, California Division of Safety of Dams, California Department of Fish and Wildlife, State Coastal Conservancy, California Environmental Protection Agency, Bay Conservation and Development Commission
Federal Government Agencies
Bureau of Reclamation, Federal Energy Regulatory Commission, United States Environmental Protection Agency, United States Army Corps of Engineers, National Oceanic and Atmospheric Administration Fisheries, United States Fish and Wildlife Service

Page: 67

Number: 1 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:27:33 AM

, South Bay Water Recycling, City of Palo Alto, City of Sunnyvale

Table SFB-5 Groundwater Level Monitoring Wells by Monitoring Entity in the San Francisco Bay Hydrologic Region

State and Federal Agencies	**Number of Wells**
USGS	6
Total State and Federal Wells:	**6**
Monitoring Cooperators	**Number of Wells**
Napa County Flood Control and Water Conservation District	12
Total Cooperator Wells:	**12**
CASGEM Monitoring Entities	**Number of Wells**
Alameda County Water District	26
City of Pittsburg	9
Coastside County Water District	1
County of Napa [NOT YET DESIGNATED]	14
Montara Water and Sanitary District	6
San Francisco Public Utilities Commission	16
Sonoma County Water Agency	26
Total CASGEM Monitoring Entities:	**98**
Grand Total:	**116**

Note: Additional CASGEM Monitoring Entities in the San Francisco Bay Hydrologic Region include: South Westside Basin Voluntary Cooperative Groundwater Monitoring Association (7 wells); Sonoma County Permit and Resource Management District (76 wells); Santa Clara Valley Water District (XX wells); Zone 7 Water Agency (XX wells).

Page: 71

76 Number: 1 Author: georcook Subject: Highlight Date: 12/3/2013 1:09:21 PM

Santa Clara Valley Water District is the designated monitoring entity for the Santa Clara Subbasin and has 94 wells.

77 Number: 2 Author: georcook Subject: Highlight Date: 12/3/2013 1:10:00 PM

94 wells

	Structural Approaches						Land Use Management								Preparedness, Response, and Recovery										
	Flood Projects						Flood Plains			Flood Insurance			Regu-lation		Data Manage-ment			Event Management							
	Financing	Development	Construction	Operation	Encroachment	Maintenance	Conservation	Restoration	Delineation	Administration	Participation	FIRM mapping	Building permits	Designated flood ways	Data collection	Hydrologic	Data station	Flood education	Preparedness	Response	Response	System	Recovery funding	Recovery	Mitigation
Santa Clara Valley Water Agency	☐	☐	☐	☐	☐	☐	☐	☐			☐							☐	☐	☐	☐				
Sonoma County Water Agency	☐	☐	☐	☐	☐	☐												☐							
Zone 7 Water Agency	☐	☐	☐	☐	☐	☐												☐							

Note: FCWCD=Flood Control and Water Conservation District

Page: 80

78 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:29:14 AM

SCVWD also does data collection and operates data stations

Table SFB-13 Flood Control Facilities, San Francisco Bay Hydrologic Region

Facility	Stream	Owner (Sponsor)	Description	Protects
Reservoirs and lakes				
1 ~~Chesbro~~	~~Llagas Cr.~~	~~Santa Clara Valley WD~~	~~3 taf flood control~~	~~San Jose~~
L. Del Valle	Arroyo Valle	DWR	38 taf flood control	Pleasanton, Fremont, Niles, Union City
Cull Cr.	Cull Cr.	Alameda Co. FCWCD (NRCS)	310 AF flood control	Castro Valley
Non-storage flood control facilities				
Alameda Cr.	Alameda Cr.	USACE	Channel Improvement	Livermore Valley, Niles Canyon, coastal plain
Emeryville Marina—Point Park	San Francisco Bay	USACE	Bank protection	Emeryville
Fairfield Streams	Ledgewood Cr., Laurel Cr., McCoy Cr., Pennsylvania Ave. Cr., Union Ave. Cr.	USACE	Channel enlargement, creek diversion	Fairfield and vicinity
San Lorenzo Cr.	San Lorenzo Cr.	USACE	Levees, concrete channel	San Lorenzo, Hayward
Walnut Cr.	Walnut Cr., San Ramon Cr., Grayson Cr., Pacheco Cr., Pine Cr., Galindo Cr.	USACE	Levees, channel stabilization, channel improvement	Walnut Creek, Concord, Pacheco, Vine Hill, Pleasant Hill
Corte Madera Cr.	Corte Madera Cr. and tributaries	USACE (Marin Co. FCWCD)	Channel improvement	San Anselmo, Ross, Kentfield, Larkspur, Corte Madera, Greenbrae, Fairfax
Novato Cr.	Novato Cr., Warner Cr., Avichi Cr.	Marin Co. FCWCD	Channel improvement	Novato
Coyote and Berryessa Crs.	Coyote Cr. (Santa Clara Co.), Berryessa Cr.	USACE (Santa Clara Valley WD)	Channel improvement	Alviso, Milpitas, San Jose
Guadalupe R.	Guadalupe R.	USACE (Santa Clara Valley WD)	Channel improvement, bypass tunnel	San Jose
San Francisquito Cr.	San Francisquito Cr.	San Francisquito Creek JPA	Levee restoration	East Palo Alto, Menlo Park
Napa R. Basin	Napa R., Napa Cr.	USACE (Napa Co. FCWCD)	Levees, floodwalls, bypass, channel improvements	Napa, St. Helena
Petaluma R.	Petaluma R.	Sonoma Co. WA	Floodwalls	Petaluma
Wildcat and San Pablo Crs.	Wildcat Cr., San Pablo Cr.	USACE (Contra Costa Co. FCWCD)	Levees, channel, channel improvements, sedimentation basins	San Pablo, Richmond
Coyote Cr.	Coyote Cr. (Marin Co.)	USACE	Lined and unlined channels	Tamalpais Valley

79 Number: 1 Author: trachemm Subject: Cross-Out Date: 12/3/2013 11:29:47 AM

Chesbro is in the Central Coast. Doesn't protect San Jose.

Table SFB-14 Groundwater Management Plans in the San Francisco Bay Hydrologic Region

Map Label	Agency Name	Date	County	Basin Number	Basin Name
SF-1	**Santa Clara Valley**	~~2001~~	Santa Clara	2-9.02	Santa Clara Subbasin
	No signatories on file				
SF-2	**Sonoma County**	2007	Sonoma	2-2.02	Sonoma Valley Subbasin
	City of Sonoma			2-19	Kenwood Valley
	Valley of the Moon Water				
SF-3	**Zone 7 Water Agency**	2005	Alameda	2-10	Livermore Valley
	No signatories on file		Contra Costa	2-7	San Ramon Valley
SR-27	**Solano Irrigation District**	2006	Solano	5-21.66	Solano Subbasin
	No signatories on file			2-3	Suisun-Fairfield Valley
					Non-B118 Basin

Page: 83

80 Number: 1 Author: georcook Subject: Highlight Date: 12/3/2013 1:13:36 PM

Water District

81 Number: 2 Author: trachemm Subject: Inserted Text Date: 12/3/2013 11:30:05 AM

2012

82 Number: 3 Author: georcook Subject: Highlight Date: 12/3/2013 1:14:30 PM

As the groundwater management agency no other signatories required - adopted by our Board of Directors

Table SFB-18 Groundwater Ordinances that Apply to Counties in the San Francisco Bay Hydrologic Region

County	Groundwater Management	Guidance Committees	Export Permits	Recharge	Well Abandonment & Destruction	Well Construction Policies
San Francisco	-	-	-	-	Y	Y
Sonoma	-	-	-	-	Y	Y
Napa	-	Y	-	-	Y	Y
Solano	-	-	-	-	Y	Y
San Mateo	-	-	-	-	Y	Y
Alameda	-	-	-	-	Y	Y

Page: 87

83 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/5/2013 11:07:07 AM

Ordinances 89-1 (Groundwater Management) and 90-1 (Well Construction and Destruction) were adopted by Santa Clara Valley Water District Board of Directors and should be reflected in this table

Also, the District Act covers groundwater management and guidance committees

Table SFB-20 Potential New Data Monitoring Programs, San Francisco Bay Hydrologic Region

Program	Potential Implementing Agency	Program Description
Water Supply-Water Quality		
Regional Groundwater Monitoring Program	DWR	Initiate a regional groundwater monitoring program, which combines disparate or various local groundwater monitoring efforts in a single, comprehensive assessment of groundwater quantity and quality for basins within the region. Regional groundwater assessments should be conducted every 5 years.
Regional Monitoring of Emerging Contaminants	SWRCB	Conduct regional monitoring of emerging contaminants, such as endocrine disrupting compounds, in water, sediment, and aquatic species. Expand upon the existing Regional Monitoring Program for Trace Substances to include emerging contaminants. Extend the Regional Monitoring Program (RMP) to include monitoring of the quality of urban creeks in addition to sites within the San Francisco Bay.
Wastewater and Recycled Water		
Regional Recycled Water Reporting	RWQCB	Regional compilation of quantity and quality of recycled water produced and used within the region. This system would track and encourage utilization of recycled water to conserve potable supplies. Information is already provided to RWQCB.
Nonpoint Source Pollution Control Program	SWRCB	The State Water Resources Control Board is developing the Nonpoint Source Pollution Control Program to track and monitor nonpoint source pollution in the Bay Area, but it is not yet effective. The Program could be expanded to collect both runoff quantity and quality information.
Flood Protection and Stormwater Management		
Regional Monitoring of Impervious Surfaces	RWQCB	Regional monitoring of trends in urbanization through tracking the extent of impervious surfaces and undeveloped lands with the use of GIS mapping. This information can be utilized when designing restoration efforts and to examine the effects of altered hydrology on streams, and habitats. Additionally, this information will be useful for stormwater and flood control management agencies to assess application of appropriate BMPs and management measures according to the extent of imperviousness in the region.
Regional Storm Drainage Mapping	RWQCB	Collaborative effort to develop a regional map showing locations of creeks, underground culverts, storm drains, and flood control channels. Use the Oakland Museum Creek Maps as an example for a region-wide effort to map storm drainage networks. This information will improve regional efforts for habitat restoration, flood control, and water-quality monitoring.
Regional Monitoring of Floodplains	BAFPAA	Regional mapping and monitoring of floodplains, including acreage protected, connectivity, and management techniques. Monitoring information would facilitate planning, design, and execution of flood-protection projects.

Page: 90

84 Number: 1 Author: georcook Subject: Highlight Date: 12/3/2013 1:34:20 PM

Monitoring programs are better handled by the local/regional agencies. Groundwater level data should be compiled from CASGEM; DWR field work is not necessary.

Table SFB-24 Resource Management Strategies Addressed in IRWMP's in the San Francisco Bay Hydrologic Region

Resource Management Strategy	IRWMP 1	IRWMP 2
Agricultural Water Use Efficiency		
Urban Water Use Efficiency		
Conveyance – Delta		
Conveyance – Regional/Local		
System Reoperation		
Water Transfers		
Conjunctive Management & Groundwater		
Desalination		
Precipitation Enhancement		
Recycled Municipal Water		
Surface Storage – CALFED		
Surface Storage – Regional/Local		
Drinking Water Treatment and Distribution		
Groundwater and Aquifer Remediation		
Match Water Quality to Use		
Pollution Prevention		
Salt and Salinity Management		
Agricultural Lands Stewardship		
Economic Incentives		
Ecosystem Restoration		
Forest Management		
Land Use Planning and Management		
Recharge Areas Protection		
Water-Dependent Recreation		
Watershed Management		
Flood Risk Management		
Flood Management		
Desalination (Brackish and Sea Water)		
Salt and Salinity Management		

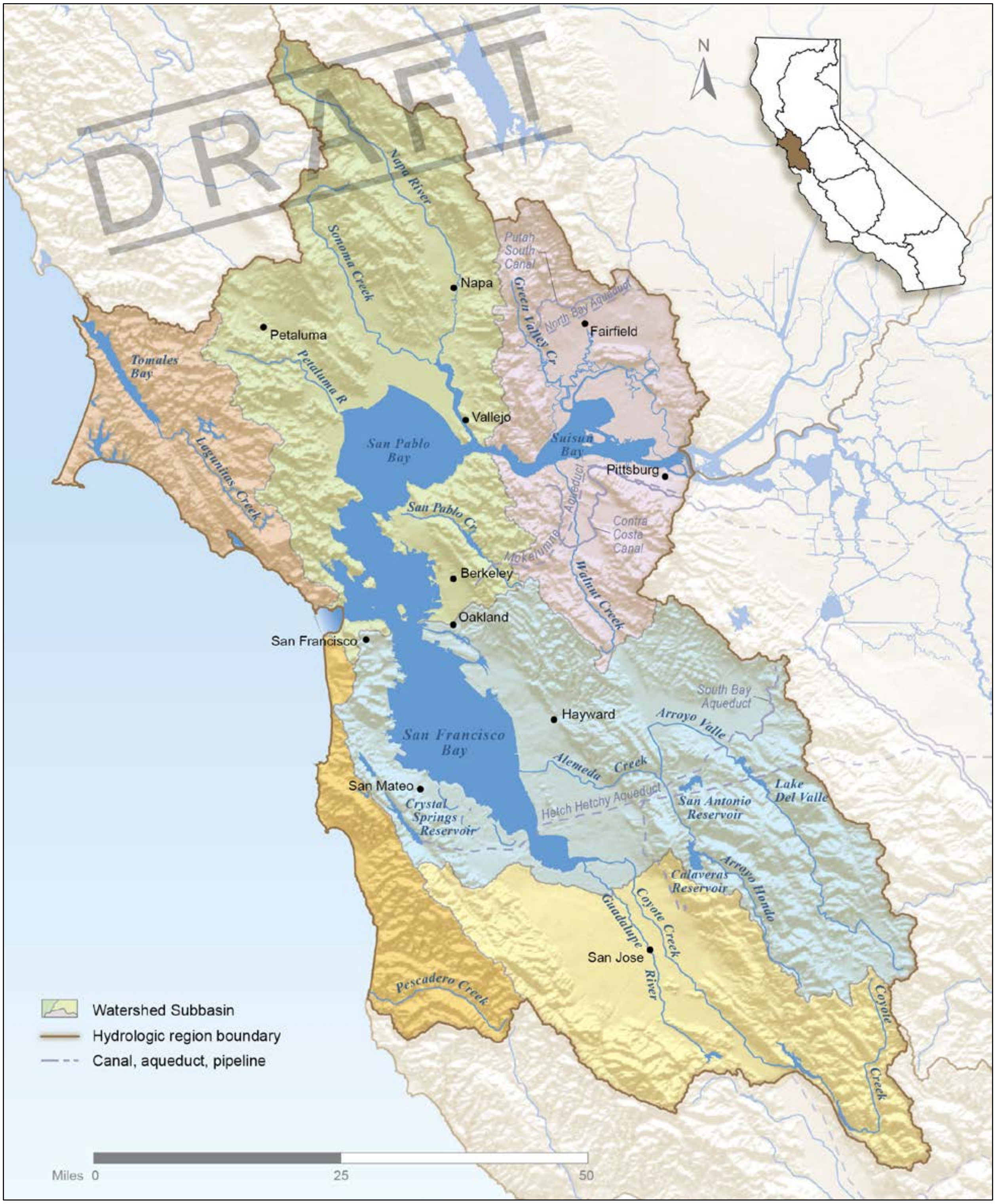
85

Page: 95

Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:32:06 AM

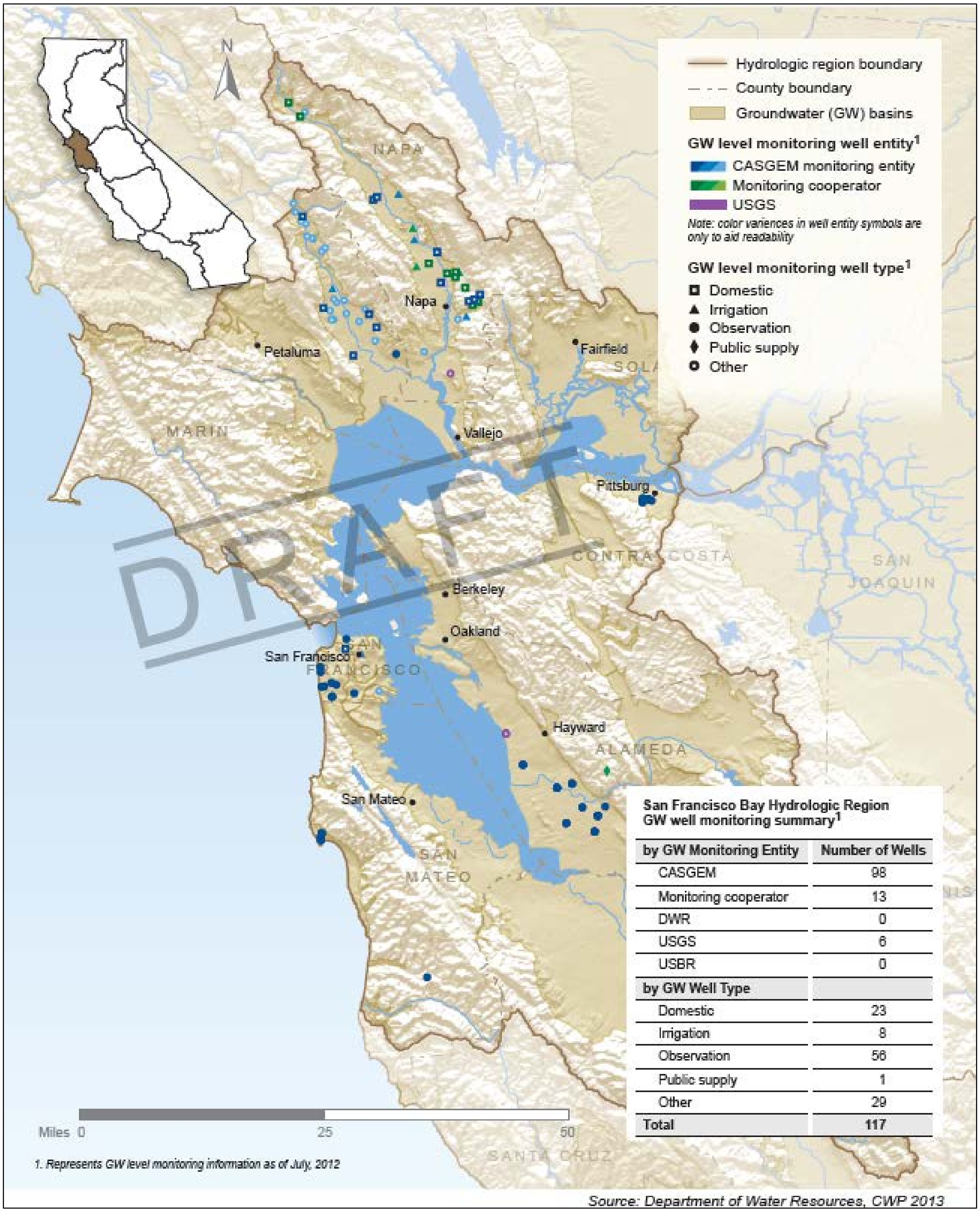
Table needs to be completed

Figure SFB-2 Principal Watersheds in the San Francisco Bay Hydrologic Region



86 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:32:52 AM
Watershed labels/names would be helpful, since several have more than one main creek/river.

Figure SFB-8 Monitoring Well Location by Agency, Monitoring Cooperator, and CASGEM Monitoring Entity in the San Francisco Bay Hydrologic Region



San Francisco Bay Hydrologic Region GW well monitoring summary[1]

by GW Monitoring Entity	Number of Wells
CASGEM	98
Monitoring cooperator	13
DWR	0
USGS	6
USBR	0
by GW Well Type	
Domestic	23
Irrigation	8
Observation	56
Public supply	1
Other	29
Total	**117**

Source: Department of Water Resources, CWP 2013

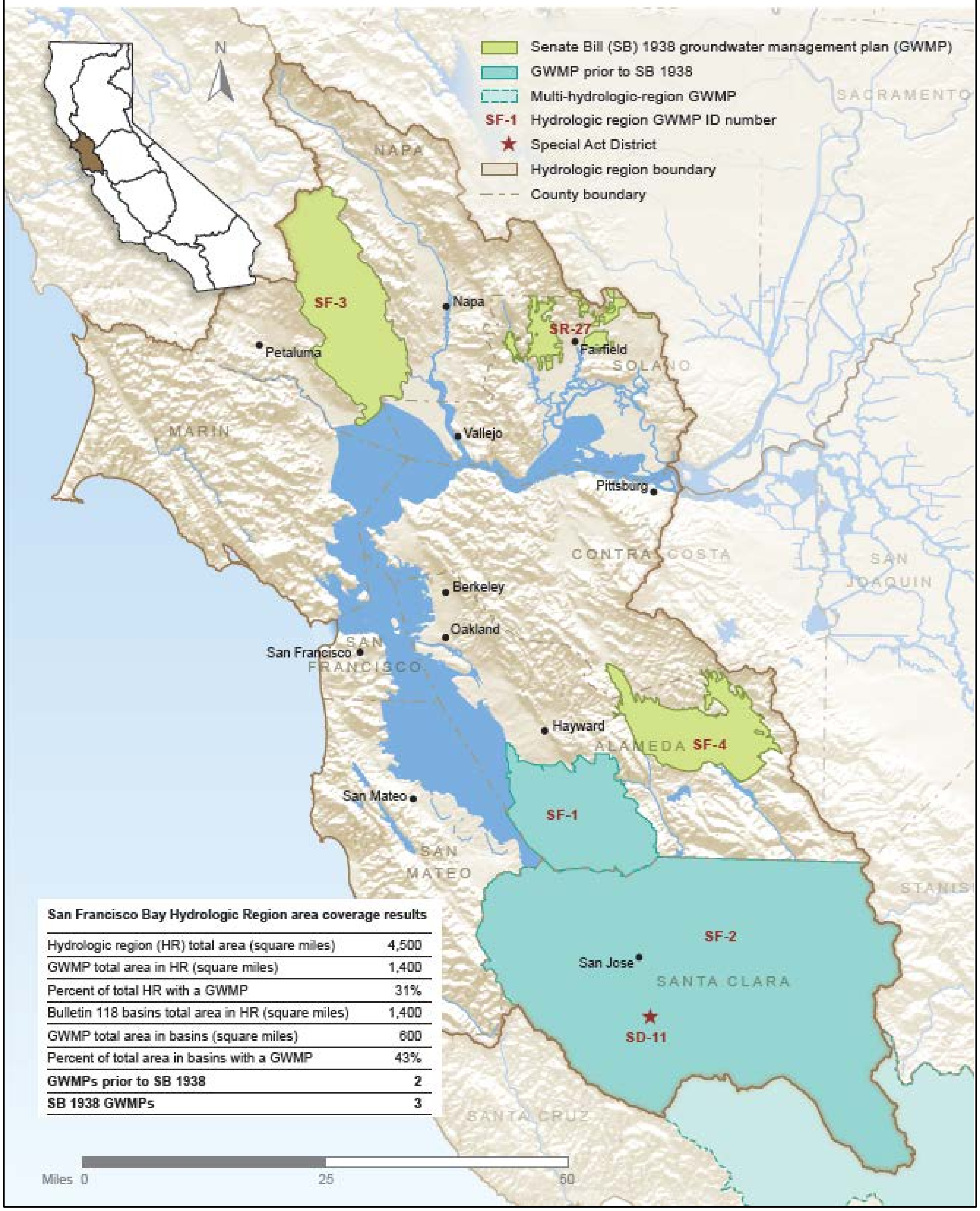
Page: 103

87 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 2:18:21 PM

Need to add Santa Clara. We have 94 wells.

Figure SFB-19 Location of Groundwater Management Plans in the San Francisco Bay Hydrologic Region

Figure SF-0 San Francisco Bay Hydrologic Region Groundwater Management Plans



San Francisco Bay Hydrologic Region area coverage results

Hydrologic region (HR) total area (square miles)	4,500
GWMP total area in HR (square miles)	1,400
Percent of total HR with a GWMP	31%
Bulletin 118 basins total area in HR (square miles)	1,400
GWMP total area in basins (square miles)	600
Percent of total area in basins with a GWMP	43%
GWMPs prior to SB 1938	**2**
SB 1938 GWMPs	**3**

88

Page: 116

Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:34:35 AM

Need to update this figure. Our 2012 GWMP meets SB 1938 requirements.

Box SFB-5 Statewide Conjunctive Management Inventory Effort in California

The effort to inventory and assess conjunctive management projects in California was conducted through literature research, personal communication, and documented summary of the conjunctive management projects. The information obtained was validated through a joint DWR-ACWA survey. The survey requested the following conjunctive use program information:

1. Location of conjunctive use project;

2. Year project was developed;

3. Capital cost to develop the project;

4. Annual operating cost of the project;

5. Administrator/operator of the project; and

6. Capacity of the project in units of acre-feet.

To build on the DWR/ACWA survey, DWR staff contacted by telephone and email the entities identified to gather the following additional information:

7. Source of water received;
8. Put and take capacity of the groundwater bank or conjunctive use project;
9. Type of groundwater bank or conjunctive use project;
10. Program goals and objectives; and
11. Constraints on development of conjunctive management or groundwater banking (recharge) program.

Statewide, a total of 89 conjunctive management and groundwater recharge programs were identified. Conjunctive management and groundwater recharge programs that are in the planning and feasibility stage are not included in the inventory.

Page: 126

89 Number: 1 Author: trachemm Subject: Comment on Text Date: 12/3/2013 11:37:59 AM

We thought this only had to do with groundwater banking projects, i.e., Semitropic. We didn't know you were looking for information on the rest of our system. It is hard to describe our system in terms of a project - it is a program that has evolved over the last 80+ years.